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P A P E R S

IN

A G R I C U L T U R E.

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## AGRICULTURE.

The SILVER MEDAL of the Society  
was this Session voted to the Right  
Hon. the Earl of BREADALBANE, for  
his PLANTATIONS of FIR TREES.  
The following ACCOUNT and CER-  
TIFICATES were received from him.

SIR,

WE do hereby certify, that the  
Right Honourable the Earl of  
Breadalbane, between the first day of  
October, 1801, and the first day of  
April, 1802, enclosed, partly by a  
dry stone wall, and partly (as the stones  
were scarce) with stone and turf, (the  
stones forming the foundation) and  
planted with Larch and Scotch Fir (ten  
of the former to one of the latter), a  
clump of high moor ground in Acharn,

E 2

Loch

24        AGRICULTURE.

Loch Tay side, altogether unfit for cultivation by the plough, containing forty-four Scotch acres or upwards, and which plants were principally one year transplanted from the seed-bed, and before planting the ground was carefully drained where necessary; and that the plants are now (December 1804) in a thriving state, and the plantation is properly fenced and secured. And it is our opinion that the proper mode for such ground is to plant Larch and Scotch Fir for shelter; afterwards to thin out the Larch and Scotch Fir, especially the latter, and plant Oaks and other Forest Trees: and all Forest Trees ought to be transplanted from the seed-bed, for at least one year, into good land, in a climate about half way between the Nursery and the ground in which they are to be planted latterly. This mode procures a strong root and a hardier plant; both which are essential to the success of the plantation.

The

## AGRICULTURE. 25

The plantation above mentioned is in the parish and near the neighbourhood of Kenmore.

C. MAC VEAN, Minister.

ROBERT ROBERTSON, Land  
Surveyor, Ashmore.

HUGH CAMERON, Tacksman,  
Acharn.

*Dec. 31, 1804.*

CHARLES TAYLOR, Esq.

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The above account was also confirmed by CERTIFICATES from PATRICK CARMICHAEL, woodkeeper, PETER M'LAREN, gardener and nurseryman, ARCHIBALD CAMERON, planter and woodherd, and HUGH CAMERON, ground-officer.

The GOLD MEDAL of the Society was this Session adjudged to THOMAS JOHNES, M.P. of Hafod, in Cardiganshire, for his PLANTATIONS of OAKS. The following ACCOUNTS and CERTIFICATES were received from him.

SIR,

SINCE the year 1798, there has been raised by Thomas Johnes, Esq. on Hafod estate, 922,000 Oaks from acorns, in order to secure a succession of Oak timber. The acorns were sown in the nursery in rows about a foot distant, so that they might more easily be kept clean from weeds. There is one great advantage in having them sown in rows, as a man can go with a spade and cut the perpendicular roots, after which they make fine lateral roots, and have no need to be transplanted for

two

## AGRICULTURE. 27

two years. If they are too thick in the rows, we thin them so that they may grow stronger. The above trees are at this time in a very thriving condition.

JAMES TODD, Gardener.

*Hafod, Dec. 12, 1802.*

Mr. CHARLES TAYLOR.

SIR,

I NOW enclose you such an account as I hope will be satisfactory, and entitle me to the Honorary Premium of the Society, either for my Oaks, Larches, or Timber trees in general. In December, 1802, I wrote to inform you that my gardener had raised for me 922,000 Oaks, and which were then two years old in the nursery: of the above 58,600 were planted out last winter and last spring, agreeably to the Accounts and Certificates I have transmitted you. They are now in a thriving state. From the 24th June, 1801, to

E 4

June,

June, 1802, 220,000 Larches were planted in the manner I have formerly mentioned, by making holes and covering the roots. All of which were planted on land not fit for the plough, and are well secured by good fences.

I am, Sir,

Your most obedient servant,

THOMAS JOHNES.

*Hafod, Jan. 7, 1805.*

To CHARLES TAYLOR, Esq.

Account of Trees planted for Thomas Johnes, Esq. of Hafod, in the county of Cardigan, in the year 1804.

On soil that could not be cultivated by the plough I have planted, this year, for him on Hafod Demesne the following trees, viz. 58,600 Oaks, 96,000 Beech, 20,400 Larch, and 400 Alders. As witness my hand, this 3d day of Nov. 1804.

DAVID RICHARDS, Gardener,

A Cer-

## AGRICULTURE. 29

A Certificate from the Rev. Lewis Evans, Minister of Eglwys Newydd, dated the 5th of November, 1804, confirmed the above; adding that the same are well fenced by a stone wall, and in a thriving condition.

The

30      AGRICULTURE.

The GOLD MEDAL of the Society was this Session adjudged to JOHN CHRISTIAN CURWEN, Esq. M. P. of Workington Hall, in Cumberland, for the culture of BEANS and WHEAT. The following ACCOUNTS and CERTIFICATES were received from him.

SIR,

THE offer of a Premium by the Society of Arts, &c. for the culture of Beans preparatory to a Wheat Crop, being, as I conceive, for the purpose of demonstrating the superiority of green crops over dead fallows; I shall be considered, I flatter myself, as acting consonant to the views of the Society, in offering a detailed account of my proceedings, more especially as it will appear uncontestedly, that, if any advantage has resulted from a trial under such very unfavourable circumstances, the most sanguine expectations may fairly be

be entertained of the general utility of the system. The plot of ground on which the experiment has been made, contains forty-two acres, the soil is a stiff clay, so flat as to afford very little fall for the water. The least continuance of rain renders it unworkable, though it has been drained as far as was practicable. It was broken up in the spring of 1800, and in that and the following year was under oats, both crops very heavy; in 1802 it was set with potatoes; in June, they were run through with the potatoe harrow, and made quite flat before they could be stitched up again. The wet set in and continued so long, that the crop was in a great measure ruined, and the weeds got to such a head that it was not possible to get the ground cleaned. It was sown with wheat in November, 1802, by great exertions, but it was in so very unfit a situation that the greatest part of the seed perished; above half was re-sown with

with oats, in April, 1803, being as soon as it could be got upon. Immediately after the crop was got off (early in October, 1803) the stubble was turned up: in many parts the grass was so thick and strong, as to make it difficult for the plough to get through it. The winter proved so mild that it had done it little good. In many parts the harrows could not break it, and the grass was obliged to be cut and carried off by the hand. The advantage of a second ploughing would have been great, but by attempting it I might have lost the season for getting in the beans; I was restrained therefore from attempting it.—Forty acres were drilled before the end of February, 1804, with a drill of the construction of Mr. Mac Dougals, six feet wide, sowing the rows at twenty-six inches apart. The weeds and roughness of the land would not admit of the drills being kept exactly straight, which occasioned additional trouble in cleaning, as also some loss

loss in the crop. Forty-nine and a half Winchester bushels were sown.— I have been thus particular, to convey a just idea of the uncommon foulness of the ground, and the difficulty I had to contend with in consequence of it. The beans came up extremely well, notwithstanding the extreme severity of the spring. No step was taken in cleaning till the 10th of May, 1804; this neglect proceeded from the multiplicity of other business, and my over-man being unacquainted with the drill husbandry, and the advantages of beginning to destroy the weeds as early as possible; from the 10th of May till the middle of July, which was as long as it was practicable to continue, the ploughs and harrows were constantly employed, and it was twice hand-weeded during the time. The cutting of the beans commenced the 20th of August: had the weather permitted, it might have been a week earlier. The method followed, which I had

## 34 AGRICULTURE.

had practised with success the year before, was to cut and spread the beans thinly, and to leave them exposed to the sun two days previous to binding. By the 26th, the whole was cut, and the field cleaned by the 29th.—I gained by these means above a month, which on wet land is of infinite advantage; I had great mortification in finding, after cutting the beans, the stitches extremely foul, notwithstanding all the pains I had taken. Any thing so dirty as this ground could seldom be met with; the season was very favourable, and I began to clean it immediately; I gave it two ploughings, and in some parts three, breaking it with harrows, raking and hand-picking it. I had, by the 20th of September, 1804, the satisfaction of seeing it in a better situation than any fallow in the neighbourhood, and began to plough for wheat; on the 29th, it was completely drilled, rolled, and water-furrowed. My friend Mr. Green,

a member of the Society, who visited the field, was so struck with the busy scene, that he requested to have the people and the horses counted. There were fifty-nine men and women, and thirty-one horses; fourteen single, and one double cart, four ploughs, four harrows, drill, roller, and water-furrow plough, a horse each. It took sixty-two and a half Winchester bushels of seed; I had sixty carts of compost per acre, composed of dung, ashes, and street-rakings, that had been collected during the summer, and laid in the most convenient situations to facilitate the work. The filling, leading and spreading of 2500 carts of compost was a work of some magnitude; the month of October proved so wet that, had it been delayed a week later, I should not have been able to have accomplished it. The labour it cost me after the beans were cut was very little inferior to a regular fallow; notwithstanding, the result, with this

## 36 AGRICULTURE.

this increased expense, will be found to be in favour of the experiment. The tick bean, which was sown on thirty-nine acres out of the forty, produced more abundantly than the other bean, which was sent me by Messrs. North and Bridge, and, being a later bean, is not adapted to this climate. The crop was good; one stalk of the tick bean had 70 pods, and these produced 353 beans; the weight, four stone thirteen pounds the Winchester bushel; the other bean, four stone four pounds. The crop produced 2,010 stooks; from a few stooks which were left out of the stacks for the purpose of affording specimens for the Society, I have reason to suppose they will yield ten quarts per stool, or 628 Winchester bushels. I estimate by the London seed, which is least productive. The selling price is 5s. per Winchester, which would make the amount £167. 9s. 4d. The stooks had been exposed to the inspection of various

various persons who wished to see in what state the beans were, so that I suppose some loss in the quantity. The following is taken from the over-man's day-book, and I believe the greatest attention was paid to have the expense correct.

	£.	s.	d.	£.	s.	d.
49½ bushels of seed, at 5s. 4d. •• 13 3 11						
40 acres ploughing and harrow-						
rowing, at 12s. ..... 24 0 0						
8 days work with drill, at 7s. 6d. 3 0 0						
4 carts two days leading weeds,						
at 5s. ..... 2 0 0						
24 women cutting weeds, at 9d. •• 0 18 0				43	1	11
141 days ploughing and harrow-						
ing, at 5s. ..... 35 5 0						
435 days work of women weeding,						
at 9d. ..... 16 6 3						
45 days work of men, at 2s. ..... 4 10 0				56	1	3
168 days work of women cutting,						
at 1s. 3d. ..... 10 10 0						
30 men's days work, at 2s. ..... 3 0 0						
66 women's days work, binding,						
at 1s. 3d. ..... 4 2 6						
22 men's ditto, making bands, &c.						
at 2s. ..... 2 4 0				19	16	6
				27	men	
	F					

38                    AGRICULTURE.

27 men and horses leading the beans off the ground, at 5s.	6 15 0	
18 women's days work, at 9d.	1 2 6	
Stacking and leading the beans	7 15 0	
		<u>15 2 6</u>
		<u>£134 12 2</u>

*Further expenses after the crop of beans was cut.*

Twice ploughing and harrowing

40 acres, at 12s. .... 48 0 0

Ditto 6 acres a third time, at 12s. 3 12 0

2 carts 6 days, leading off weeds

and stones, at 5s. .... 3 0 0

48 women picking, at 9d. .... 1 16 0

10 men ditto, at 2s. .... 1 0 0

Expense of sowing, cleaning, and reaping the beans,	Value of crop 628 bushels, at 5s. 4d. £167 9 4	<u>£57 8 0</u>
£134 12 2		

Had the wheat been

then sown, the balance in favour of the crop would

have been ..... 75 12 0

£243 1 4

By further expenses

as above ..... 57 8 0

192 0 2

Balance in favour of the green crop, giving credit for the

expense of a fallow, 51 1 2

£243 1 4

The

## AGRICULTURE. 39

The appearance of the wheat is most promising. It is my intention to take another crop of beans, which will most completely clean the ground, then give a second dressing of from 20 to 50 cart-loads of compost, and sow it with wheat and seeds in the spring.

Should farther information be requisite, I shall be happy to give it.

I am, Sir,

Your obedient servant,

I. C. CURWEN.

*Workington Hall, March 20, 1804.*

CHARLES TAYLOR, Esq.

F 2

DEAR

DEAR SIR,

A N opportunity offering by which I can send you a sample of my Beans for the inspection of the Society, I think it more advisable than waiting till the meeting of Parliament; should it occur to you that any further information is requisite, I will be much obliged to you to acquaint me with it. I think I may, without arrogating too much, say, the manner in which the crop was worked and got into the ground, and its present appearance, is not inferior to any thing which has been done in any part of the kingdom. The accounts of expense were kept with great care and attention. I shall be highly gratified in being successful in my application for the medal. Should any information be wished by the Committee, my friend, Mr. Greene, of Bedford-

ford-square, would willingly attend, as he expressed great pleasure at what he saw whilst we were putting in the crop. It has drawn the attention of the farmers in the neighbourhood ; and when I come over it again, I hope they will be sensible of the advantages resulting from the plan. I am this winter trying an experiment in feeding milch cows, and selling the milk to the poor, who have hitherto been extremely ill supplied. I conceive, by feeding the cows with green food and oil-cake, I can furnish the milk as cheap, and with as much profit as in summer. I give each cow four stone of green food, at  $1\frac{1}{2}$ d. per stone, four pounds of oil-cake at 1d. straw 2d. making the total one shilling. New milk is 2d. per quart—any thing above six quarts is profit. I have thirty cows, mostly heifers ; these afford less milk ; but I can dispose of them without loss in March or April, having no keeping

in summer, or design to interfere with other farmers. I sell near two hundred quarts per day, besides my own consumption, farm-house, &c. &c. The cattle are in admirable order. I keep them in open sheds, and turn them out several hours every seasonable day. The crops here were in general good. I had an acre and three rood of carrots, which produced five thousand stone; the ground was by no means good; but they were sown upon ridges, gathered as high as possible, with a double mould-board plough, and kept well worked during the summer. My success will induce many trials. I give five pounds each day to my horses, instead of oats, which saves me sixty Winchester bushels per week, or £20. The Bishop of Llandaff is very busily employed planting a hundred acres, mostly with Larch; not to interfere with him,

## AGRICULTURE. 43

him, I wait till next year, when I shall plant between one and two hundred acres, lately purchased.

With great respect,  
I am, dear Sir,  
Your obedient humble servant,  
J. C. CURWEN.

*Workington-Hall, Nov. 20, 1804.*

CHARLES TAYLOR, Esq.

Certificates from Mr. Archibald Dickson, of Hassendeanburn, near Howich; Messrs. William Falla and Co, of Gateshead; Matthew Foster, John Hetherington, John Atkinson, and Humphry Tyson, of Workington; and Isaac Kendal; confirmed the Accounts received from Mr. Curwen.

DEAR SIR,

I WISH to add to the communication I had the pleasure of making to you, respecting the culture of Beans, that I have thrashed out two stacks, and found the straw most admirable fodder. Horses are extremely fond of it ; and I have, in no instance, found it to disagree with them, which I have understood to be frequently the case when the bean stands till it is quite withered. This advantage in favour of cutting the bean green had not occurred to me, and will add much to the value of the crop, and supply the place of oat straw, which is nearly of equal value with hay. I have not used any hay this season, but given bean and other straw with potatoes and corn, and find the horses in high condition. The experience of every year convinces me of the great saving in my plan of feeding, as well as its being

being the best food that horses can have for keeping them in condition and health. Lucerne and an equal quantity of corn will not keep the horses in the same condition as with potatoes. It is supposed this feed is not adapted to quick work: I can only say, I seldom travel less than eight miles per hour with my carriage-horses so fed, and I drove them thirty-five miles a few days ago, in four hours and three quarters, and this without any injury or distress to them.

With respect, I am,

Dear Sir,

Your obedient humble servant,

J. C. CURWEN.

*Workington-Hall, Jan. 25, 1805.*

CHARLES TAYLOR, Esq.

The

46        AGRICULTURE.

The GOLD MEDAL of the Society, or THIRTY GUINEAS, at his option, was this Session voted to Mr. WILLIAM TAYLOR, of Beamish, in the county of Durham, for IMPROVING LAND LYING WASTE.

Mr. TAYLOR preferred the Honorary Reward.

The following ACCOUNTS and CERTIFICATES were received from him, accompanied by a PLAN, which may be seen by application at the Society's House.

SIR,

AFTER requesting that you will accept my thanks for your very obliging letter, I beg to trouble you with an account of some land drained in a capital manner by my steward, Mr. Taylor, of Beamish, near Chester-le-Street, in the county of Durham; which he

he wishes may be laid before the Society, in the hope that his labours may receive some premium.

I knew perfectly well this land before he bought it; and as my allotment adjoins to it, I have frequent opportunities of viewing it, and I do not think Mr. Martindale, who has valued it, is too high in his valuation.

Mr. Martindale is a man of character, and frequently employed as a commissioner in dividing commons, &c. and ought to know well the value of land.

I am, Sir,

Your very humble servant.

JOHN EDEN.

*Pall-Mall, May 29, 1804.*

To Mr. CHARLES TAYLOR.

SIR,

SIR,

I PURCHASED on the 27th day of May 1799, at a sale, 308 acres of common or heath land, over-run with whins, ferns, and obnoxious heath-grasses, springs, bogs, and spungy lands, for the sum of £2665, without any buildings; and being no farmer before that time, I have it in my power to state the expense that has been incurred in draining this barren or waste land, and the utility it is to this country, to use every exertion to bring into cultivation the many thousand acres which at present lie waste, and, where it cannot be improved, to convert it into plantations. The difficulties with which I had to contend at the outset were innumerable, and attended with great expense and inconvenience, having neither buildings nor food for my horses to cultivate the land,

and

and hay was at that time £8. per ton—160 stone at 14lb. to the stone, and oats 6s. 3d. per bushel. In the summer months, my ten horses grazed on the common; but in the winter, I was obliged to seek shelter in the new buildings belonging to Sir John Eden, which were erected for his adjoining allotment; this cost me a considerable sum of money before I could reap any provender for my horses, (which was a space of 15 months). Having purchased so late as the 27th of May, I could get no produce that year. The draining, paring, burning, and making new hedges, was my first and necessary object to pursue. The drains have been made of various sorts, as described in my plan, some deep drains with flag-bottoms and side-walls, from 18 to 20 inches in height, and well covered, and a quantity of land-stones for the water to ooze through into the drains. The greatest difficulty in draining was, where I met with running sands.

sands. Stones were of no use, as they sunk (from the colliery borings made in the land, it appeared, the depth of sand and water was 28 yards); consequently I had recourse to prop-ends, from 9 to 18 inches long (refuse wood left underground in collieries), and strong whin shanks, and so made drains of a kind of trellis, or wicker-work ; and these being light, may be called a kind of swimming drain, being well covered with a turf sod on straw, and have answered for upwards of three years extremely well, and no appearance of any failure, as I have had occasion to extend new drains into them, and found them entire. The land was in that state, I could grow no hay for my work horses, and it could not be expected for three years: it must be supposed, the consumption of corn was great ; but in this I experienced a considerable alleviation. At that juncture, Sir John Eden having extensive allotments which I have had to manage and bring

bring into cultivation, and on which was growing a considerable quantity of corn, he purchased a straw-chopper, that the horses corn might be mixed with straw (the number of horses employed in his colliery was considerable, and draught horses 18): this answered very well; but the manual labour to be done was severe, and took up much time; and, having a thrashing machine, I got the straw-chopper fixed to go by the same power, which answered the purpose completely; for two women can manage the feeding for 9d. per day each; and when the thrashing machine is not going, a boy to drive a galloway, and these two women, can perform more work than six men at 2s. 3d. each. The advantages arising from the use of this machine were so obvious, that I immediately procured one: but a few days experience convinced me, that a great improvement might yet be made, that if the machine would chop the oat sheaves

sheaves, the thrashing would be saved, and the corn would be cut. Having the knives in good condition, the straw and oats were chopped and so mixed, that they could not be swallowed unless well chewed. By giving my horses no corn by itself, as it is often wasted by their greediness of swallowing it, particularly old horses, I found upon calculation so considerable a saving by giving them their food in this way, rather than the general allowance of corn alone given to work horses, that from the commencement of using the straw-chopper, my ten horses have not eaten ten stone of hay each; I give them straw in the fold-yard, and their chopped straw and corn in the stable. I found it of the utmost utility to Sir John Eden and myself, to give to each man a fair proportion of this provender in bags, when they go to their day-work, allowing no hay; for it is well known to every experienced farmer, the loss he suffers

suffers by giving his men hay when they go from home; as, frequently, one-fourth part is left in the corner of the fields, or by the side of the highways. By the manner of feeding horses described, I can confidently say, one-fourth part of the value of the food is saved, and the spirits and condition of the animal superior to the common mode of feeding; and I have the pleasure to add, my servants are often complimented on the fine condition and sleek skins of the horses. I have with this report sent a small sample of the performance of the straw-chopper, in cutting oat sheaves.

Having no pasturage for my horses, the second year I summer-fallowed 20 acres of land of an equal soil; and in the beginning of August had the same sown with grass-seeds, and divided into four parts, with a different proportion of seeds, as a future guidance, to inform myself which answered the best; and herewith have sent you the result of the

G trial

## 54 AGRICULTURE.

trial and expense, marked B in the plan. Also, have presented an account of the weight and value of hay, the produce of five acres of drained land, as marked D in the plan; which, with the remainder of the field, was well summer-fallowed and limed, and sown the latter end of July, 1802, with rye-grass and white and red clover, the whole produce of which was 35 tons.

The whole of the estate is now got into cultivation, except some patches of land that cannot be cultivated, and inaccessible banks. I have converted the best parts into nursery beds, which contain three acres of small pieces, in different parts; and have about 17 acres of banks yet to plant, as my seedling trees advance.

*Expense on 20 Acres of Land laid to Grass*

B	£.	s.	d.
Stubbing and burning whins, as			
per bargain, .....	20	0	0
Paring, as per bargain, .....	20	0	0

Burning

## AGRICULTURE.

55

	£.	s.	d.	£.	s.	d.
Burning sods and spreading ashes,	7	10	0			
Ploughing at 12s. per acre, (first time) .....	12	0	0			
Ploughing at 8s. per acre, (second time) .....	8	0	0			
Harrowing twice, at 5s. per acre,	5	0	0			
Rape seed, .....	2	4	0			
Draining, as per account, .....	31	18	8			
	<hr/>			<hr/>		
	106	12	8			
Received for rape, (a bad crop) ..	51	12	0			
	<hr/>			<hr/>		
				55	0	8

*Fallowing the same in the Autumn*

1800, and Summer 1801.

Thrice ploughing, at 8s. per acre,	24	0	0			
Harrowing four times at 2s. 6d. per acre, .....	10	0	0			
Twice weeding and gathering, as per bill, .....	22	18	0			
Lime, sixty fothers, slaking and spreading at 12s. 6d. per fother,	37	10	0			
Grass seeds, as per account, .....	22	18	8			
Harrowing and rolling, at 7s. 6d. per acre, .....	7	10	0			
	<hr/>			<hr/>		
				124	16	8
Nearly £9. per acre.				<hr/>		
				£179	17	4

1801, August 1st—Sown with grass seeds, viz.

One quarter part, old land hay seed 10  
bushels, white clover 7 pounds, per }  
acre. } did not answer.

G 2

One

56 AGRICULTURE.

One quarter part rye-grass, 1 bushel per acre, white clover 7 pounds per ditto. { Second year answered well for pasture.

One quarter part,  $\frac{1}{2}$  bushel rye-grass { first and second year.  
3lbs. of red clover, 7lbs. white clover.

One quarter part, hay seeds, white and red clover, and hop clover. .... { Not so well.

From the former experiment it appears, that one bushel of rye-grass was over much for an acre, as it choaked or destroyed a part of the white clover;— this clover, which is apparently a native of heath-lands (as may be observed in some parts of extensive commons that have never been in cultivation), thrives well in most situations, and improves in quality the second year, as I have observed: I can say for no longer, as my land is not in a state to be continued long at grass, and I am pursuing the following state of cultivation. First, to fallow, clean the land well, and lay not less than 3 or 4 fothers of clod lime, equal to 24 or 32 bolls per acre, with a fair

fair proportion of manure, and sow the same in the early part of June, with turnips, to be eaten in the winter months with sheep, and sown in the spring with such kind of grain as I think the land best adapted for; and also, sowing six pounds of white, and four pounds of red clover, with half a bushel of fine rye-grass. The first year, the seeds to be mown, the second year pasture, and the third year oats, and the following year to be fallowed, and so in rotation; and this scheme of husbandry I shall pursue, until I am perfectly satisfied the heath roots are sufficiently destroyed.

Drain D. described in the plan as being a pool of water, was sown with grass-seeds when fallow, containing five acres, in August, 1802; and mown the 14th day of June, 1803. Produced 2 tons 14 cwt. of fine hay per acre, reckoning 160 stone per ton, which is equal to 13 tons 10 cwt. at £5 per ton.

GS amounting

amounting to £67. 10s. and the fog, or second grass, was worth 25 shillings per acre, for eatage.

This shows the utility of draining; and from the long experience I have had in the management of Sir John Eden's extensive draining, I have always calculated at 30 per cent. profit; and in some situations, I have proved draining to have paid the expense and rent the first year's crop, and the following year double the rent: this was to me a great inducement for engaging with so large a tract of waste and barren land to improve.

*Cash Dr. to William Taylor, as expended  
on Pelton Grainge Estate.*

	£. s. d.
Casting drains as per bargain 3 feet deep—breadth at top 3 feet—at bottom, $1\frac{1}{2}$ feet; making the same complete as per plan, from June 21st 1799, to De- cember, 1801; $2\frac{1}{2}$ years, being 19,257 yards, or 10 miles, 1657 yards, .....	567 1 0 $\frac{1}{2}$

In 1802 and 1803—4805 yards—2 miles 1285 yards.—Total, 24,062 yards, or 13 miles 1182 yards, .....	140 2 11
--	----------

A. A. Making

£. s. d

A. Making drains as per day's work, which could not be done by bargain, from 6 to 9 feet deep, in a black peat moss and running sand, and bringing up a drain B by the side of the high road, from 9 to 12 feet deep, walling and flagging the bottom.—Length, 208 yards, to prevent a runner of water overflowing several acres of flat land, and also to prevent the water from getting into a number of drains to the East. (See plan C C) .....	47 12 9
C. Making drains as per day's work, in a black peat moss, and running water, with sand 9 feet deep; also, containing large bogs of water with fluent springs. When the water was drained off, the ground lowered 6 feet .....	35 8 0
D. Making a large drain, 978 yards long, and 7 feet deep throughout; walling and flagging the same, to clear a parcel of ground, upwards of 5 acres, and a large feeder of water; and also, making an open drain to take off the day water, which nearly overflowed this quantity of land, in snowy and wet weather, and rendered it entirely useless, .....	37 8 1
	E. Bringing

	£. s. d.
E. Bringing up levels out of Black-bourn, and draining a bog on a deep peat moss a considerable depth, to bring other drains through the same .....	23 0 0
F. Taking up a level in a place called Hereford Stells; to drain a lough, or deep pool of water, lying in the middle of a large piece of flat land. This drain was the whole length from 9 to 12 feet deep, 8 feet broad at top, and 4 at bottom, in a strong running sand, walling and flagging the same; here we unfortunately, from contending with water and sand, lost level, and this work is now doing over again, .....	29 0 0
In 1802 and 1803 draining the above; bringing up levels 3 feet deeper, and making additional drains. First length 105 yards, from 11 to 14 feet deep, and 3327 yards; 7, 8 and 9 feet deep; flagging, walling and making the same complete .....	34 5 9
H H. Cutting Black-bourn by the side of the high road; making a wall 6 feet high, and penning the bottom, to prevent the water overflowing a quantity of land, where it ran in a zig-zag form, .....	16 0 0

Black-bourn,

Black-bourn, which runs through the middle of the estate, I was under the necessity of cutting straight, it running in a zig-zag form; also in other places; and brought up levels to make drains into this little rivulet, which in wet weather overflowed several acres of land; and would have over-run a large quantity of deep drains C C. The same is by measurement, in length, 1188 yards, at 5d. per yard; being 4 feet deep, 4 feet broad at top, and 3 feet at bottom; this is upon a vague calculation, as no account was kept, but was in the general account of expenditure, .....

£. s. d.

24 15 0

G G. Cutting Twizell-bourn straight, a rapid running water, and cutting through a hill where the drain was 50 feet deep; piling, and fendering, which gained a quantity of haugh-land, and covering the old bourn-way with soil. I have not the particular days works, as they are in the general account of expenditure, but am certain they would exceed .....

55 0 0

*Annual Expense from the Commencement, viz.*

From the 27th May, 1799, to the £. s. d.	
31st January, 1801, .....	2168 4 6
Received in the above time, .....	151 18 0
One year and seven months	1916 6 6
	Expenses

## AGRICULTURE. 63

	£. s. d.	£. s. d.
Expenses brought forward .....	1916	6 6
Expended from the above time to 22d of Novem- ber, 1801, viz. .....	2246	9 5
Deduct on account of pur- chase money, .....	1000	0 0
	<hr/>	1246
	9 5	
Received in the above time,	384	4 6
	<hr/>	862
	4 11	
Expended from the above time to 22d Novem- ber, 1802, .....	3059	6 6½
Deduct in full for purchas- money .....	1665	0 0
	<hr/>	1394
	6 6½	
Received in the above time,	605	0 9
	<hr/>	789
	5 9½	
Expended from the above time, to 22d of Novem- ber, 1803, .....	1087	4 5
Received in the above time,	855	3 3
	<hr/>	232
	1 2	
Expended over and above what has been received, .....	3799	18 4½
Purchase as above, .....	2665	0 0
	<hr/>	£6464
	18 4½	

### TOTAL DRAINING PER PLAN.

	Miles.	Yards.
1st as per account of plan .....	13	1182
AA .....	0	208
CC .....	0	886
		D

## 64 AGRICULTURE.

		Miles.	Yards.
<b>D</b>	.....	0	976
<b>E</b>	.....	0	467
<b>F</b>	.....	0	105
<b>F</b>	2d time making complete	1	1567
<b>HH</b>	.....	0	108
Black-bourn open drain, as per plan	.....	0	1188
<b>GG</b>	ditto	0	1260
Total	.....	18	907

### *Valuation of Stock at Martinmas, 1803.*

	£.	s.	d.
1420 thraves of oats, at 7s.	497	0	0
518 ditto of maslin, at 10s.	259	0	0
50 ditto of barley, at 5s.	12	10	0
Turnips	140	0	0
26 acres of maslin, sown at £3	78	0	0
30 tons of hay, at £5	150	0	0
10 horses	168	0	0
Carts, ploughs and harrows	87	0	0
1400 yards of hurdles, at 6d.	35	0	0
2 cows	28	0	0
Cattle in hand	359	15	5
Swine	16	0	0
Valuation of nursery trees, per account	123	11	0½
Thrashing machine	60	0	0
Straw chopper	12	0	0
2 winnowing machines	15	0	0
Old oats sold	17	14	0
	£2058	10	5½
	<i>Valuation</i>		

*Valuation of Pelton Grange Estate,  
in the Parish of Chester-le-Street, and County of Durham, belonging to  
WILLIAM TAYLOR, Esq.*

Quantity	Tenure	Average value per acre	Annual value	Years purchase	Total value
Acres		£. s. d.	£. s. d.		
151	Freehold	1 4 0	181 4 0	27	4892 8 0
75	Copyhold	1 7 6	103 2 6	24	2475 0 0
59	Leashold	1 7 6	81 2 6	18	1460 5 0
22	Do. to plant	0 10 0	11 0 0	18	198 0 0
307			376 9 0		9025 13 0

"The above is a fair Valuation of the Estate, according to the best of my skill and judgment.  
JOHN FRYER.  
Newcastle, 24th March, 1804.

66 AGRICULTURE.

TOTAL EXPENSE.

	£. s. d.
Purchase .....	2665 0 0
Title obtaining .....	176 9 3
Buildings (no farm house) .....	935 0 0
Draining, hedging, planting quicks, nurseries, per account .....	1960 10 5½
Agency for self 2½ years (afterwards got a person to manage) .....	125 0 0
Interest due on the purchase, and on mo- ney expended from the commence- ment to Nov. 22d, 1803.....	750 0 0
Incidentals, horses, taxes, and cesses .....	477 18 7½
	<hr/>
	7089 18 4
Valuation of stock at Martinmas, 1803..	2058 10 5½
	<hr/>
	£5031 7 10½
	<hr/>

Valuation of the estate made by Mr. John Fryer, as per account annexed .....	9023 13 0
Expended as above .....	5031 7 10½
	<hr/>
Gain .....	£3992 5 1½
	<hr/>

Valuation

## AGRICULTURE. 67

	£. s. d.	£. s. d.
Valuation of stock at Mar-		
tinmas, 1803, .....	2058 10 5½	
The former year's valuation .....	1353 15 6	
	£704 14 11½	
This year's payments, ....	1087 4 5	
Deduct incidental charges		
for obtaining title, in-		
cluded in the above sum, 176 9 3	910 15 2	
This year's receipts .....	855 3 8	
	55 1 1	
Gain .....	£649 3 0½	

### *Valuation of Forest Trees in the Nursery, November 25, 1893.*

	£. s. d.
163516 Oak trees, at 10s. per thousand, 81 15 2	
12574 Quicks, at 7s. 6d. ditto, ..... 4 13 8½	
16740 Beech trees, at 11s. ditto, ..... 9 4 1	
3540 Silver firs, at 23s. ditto, ..... 4 1 6	
1436 Larch firs, at 30s. ditto, ..... 2 3 0	
560 Alders, at 20s. ditto, ..... 0 11 0	
714 Scotch firs, at 10s. ditto, ..... 0 7 0	
4000 Larch, at 15s. ditto, ..... 3 0 0	
4400 Hazels, at 30s. ditto, ..... 6 12 0	
1200 Hollies, at 5s. ditto, ..... 0 6 0	
566 Ashes, at 10s. ditto, ..... 0 5 6	
576 Sycamores, at 10s. ditto, ..... 0 5 7	
	113 4 6½
	<i>Planted</i>

68 AGRICULTURE.

	£. s. d.		£. s. d.
Brought forward .....	113 4 6½		

*Planted in 1802 & 1803.*

2300 Larches, at £2 per thou-	
sand, .....	4 2 0
1500 Oaks, at £3 ditto, .....	4 10 0
500 Scotch firs, at 25s. ditto, ..	0 12 6
300 Beeches, at £2 ditto, ..	0 12 0
	10 6 6
Received of the Honourable Lord Eldon,	
(by Sir John Eden) for oaks to plant	
on his Eldon estate, .....	12 0 0
	£135 11 0½

A large quantity of forest seeds sown in 1803, which cannot be ascertained.

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Certificates received from Mr. Matthew Forster, of Broomyholme, and from Wm. Nesfield, Esq, one of his Majesty's Justices of the Peace for the county of Durham, confirmed the above statements, and that the ground now produces rich and abundant crops.

The

The SILVER MEDAL of the Society was this Session voted to Captain JOHN MILLER, of New Park, Axminster, Devonshire, for his new-invented SHEEP-SHEARS, ENGRAVINGS of which are annexed, and a Pair of the Shears reserved in the Society's Repository.

The following ACCOUNTS were received from him.

SIR,

B  
EING present at the shearing of some sheep, in July, I observed that they were frequently cut, and sometimes pieces of their skin and flesh were cut entirely off, which gives not only much pain to the animal; but if cut severely, may be attended with loss to the owner; I have therefore contrived

H a plate

a plate of iron to screw to one of the blades of the shears, the edge of which plate projects beyond the edge of the shear, so as just to be visible when the shears are open and held in the position for shearing, that is, the plate downwards, laid on the sheep; this plate must be unscrewed and taken off when the shears require sharpening. I have seen a sheep sheared with the shears I send to you; and the farmer who used them said they made as good work as those in general use; and it appeared to every one present that it was hardly possible to cut the sheep in using them. The experiment was made at a farm called New Park, near Axminster, belonging to Mr. John Harvey Pierce, who esteemed it as a useful invention for the purpose intended. I therefore take the present opportunity of communicating this to the Society, trusting that through their patronage of useful contrivances, it will sooner be introduced to

AGRICULTURE. 71

to the public; and if it should prove of utility, I shall feel much gratified.

I am, with great respect, Sir,

Your humble servant,

JOHN MILLER,

Post Captain, Royal Navy.

*New Park, Axminster, Devon,  
August 13th, 1803.*

CHARLES TAYLOR, Esq.

Secretary to the Society of Arts, &c.

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REFERENCE to the ENGRAVING of *Capt.*

JOHN MILLER's SHEEP SHEARS.—

*Plate I.*

SIR,

ENCLOSED I send you drawings and a further description of the Shears for which the Society has done me the

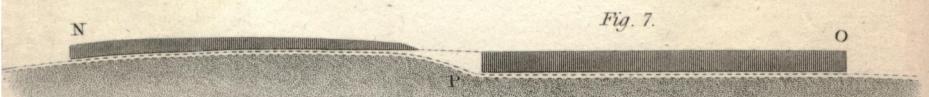
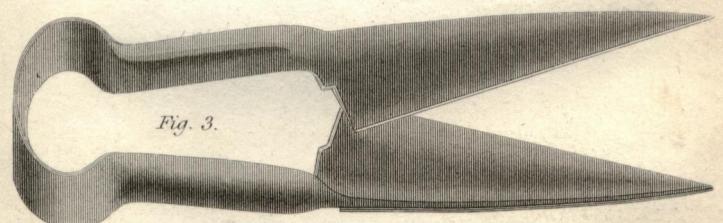
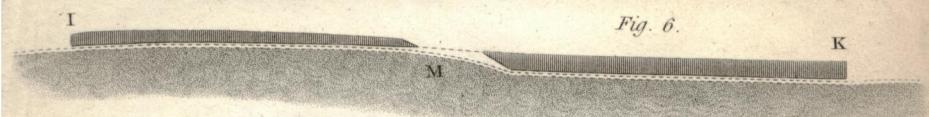
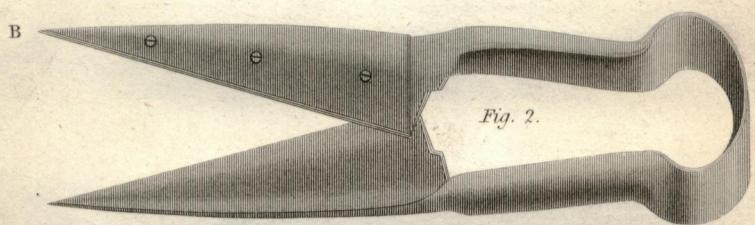
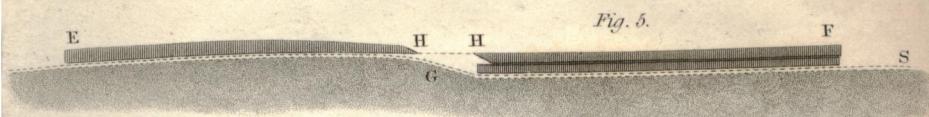
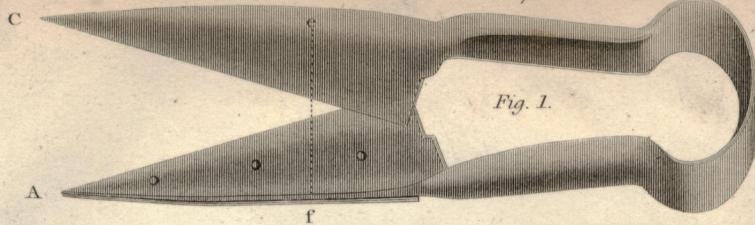
H 2 honour

honour of presenting me with the Silver Medal.

*Fig. 1*, in the annexed drawing, represents a pair of common sheep shears, with a thin plate of iron screwed with three screws to the under-part of the blade A, which plate may be about the twentieth part of an inch thick, and exactly of the same size as the blade of the shear to which it is screwed, so that the edge of the plate and the edge of the blade shall be in a line, not allowing either to project beyond the edge of the other. This plate must be unscrewed and taken off when the shears require to be sharpened; and it may be necessary to remark, that as the blade of the shear wears by frequent sharpening, the edge of this plate must also be reduced so as always to be kept in a line with the edge of the blade, and not to be left to project beyond it; for that would give the wool a sloping

*Captain I. Miller's Sheep Shears.*

Plate 1.



sloping direction, which would render it more difficult to cut. The shears represented in this Figure, are in the proper position for shearing with the right hand. The blade C, to be inserted into the wool.

*Fig. 2* shews the same shears reversed; the plate B uppermost, to shew the manner of screwing it to the blade. Counter-sunk screws are recommended; and they must not go through, so far as to take the edge of the other blade in closing the shears.

*Fig. 3.* A pair of shears requisite for a left-handed shearer; the blade D, to be inserted into the wool; for it is evident, if the shears *Fig. 1.* were used with the left hand, the blade A, with the plate, would be inserted into the wool, which would not penetrate with that facility which shearers require.

*Fig. 4* is the plate taken off, and shewn separate.

74 AGRICULTURE.

These drawings and this description will be sufficient for those who make shears, or for cutlers, who may easily make the addition requisite to the shears that they have already in their possession.

It may be imagined that if the lower blade of the shears were made as thick as the common blade and this plate together, it would have the same effect of preventing the skin of the animal from being cut: to prove that this will not be a sufficient guard, let a section of the shears be taken across the blades at *EF*, *Fig. 5*, (four times the size of the drawing, to make it more explanatory); now it appears evident, that when the edges of the plate, *HH*, come in contact (unless a very great pressure is made at the same time), the skin of the animal at *G* (which is represented by the dotted line *SS*) cannot be brought to meet the edges of the blades *HH*,

Whereas,

Whereas, supposing that the lower blade K, in the section I K, *Fig. 6*, were as thick as the common blade and the plate together, the skin at M, with a very little pressure, might be brought up close to the edges of the blades, and endanger its being cut. Such a blade as this would also take much time to sharpen. Now, admit that the lower blade is the same thickness as the last-mentioned blade (as the blade O in the section N O, *Fig. 7*), and let the lower part of this blade P be made so as to operate as the plate recommended; it will then be found that the edge of this blade is too obtuse to cut wool, although it may answer very well to cut substances of less flexibility.

If on trial it proves that there is no risk of cutting sheep with the shears I recommend, they must be of great service to indifferent shearers and to learners, as a learner may begin to practise without fear, and an indifferent

shearer may work with the greatest confidence; even to proficients they may become useful.

I am, Sir,

Your obliged humble servant,

JOHN MILLER.

*June 12th, 1805.*

CHARLES TAYLOR, Esq.

The

## AGRICULTURE. 77

The SILVER MEDAL of the Society was this Session voted to SAMUEL TAYLOR, Esq. of Moston, near Manchester, for his EXPERIMENTS on the GROWTH of WHITE-THORN, and from whom the following ACCOUNTS were received.

Specimens of the Plants are reserved in the Repository of the Society.

GENTLEMEN,

EVERY one of you, I think, will allow that Fences are material objects to be attended to in Agriculture; you must also be convinced that there is no plant in this kingdom of which they can so properly be made as the *Crataegus Oxyacantha* Linnæi, or common White Thorn. In consequence of my being convinced of this, I have been induced to make a few experiments to effect

effect the better propagation of that valuable plant; the result of which, along with specimens of my success, I beg leave to submit to your inspection.

In the year 1801, I had occasion to purchase a quantity of thorns, and finding them very dear, I was determined to try some experiments, in order if possible to raise them at a less expense. I tried to propagate them from cuttings of the branches, but with little or no success. I likewise tried if pieces of the root would grow; and I cut from the thorns which I had purchased, about a dozen of such roots as pleased me, and planted them in a border along with those I had bought. To my great astonishment, not one of them died; and in two years they became as good thorns as the average of those I had purchased. The thorns I purchased were three years old when I got them. In April 1802, I had occasion to move a fence, from which I procured as

many

## AGRICULTURE. 79

many roots of thorns as made me upwards of two thousand cuttings, of which I did not lose five in the hundred.

In the spring of 1803, I likewise planted as many cuttings of thorn roots as I could get. In 1804, I did the same; and this year I shall plant many thousands.

I have sent for your inspection specimens of the produce of 1802, 1803, and 1804, raised after my method, with the best I could get of those raised from haws in the common way, which generally lie one year in the ground before they vegetate. They are all exactly one, two, and three years old, from the day they were planted.—I was so pleased with my success in raising so valuable an article to the farming interest of this kingdom, at so trifling an expense, (for it is merely that of cutting the roots into lengths and planting them) that I was determined to make

80        AGRICULTURE.

make it known to the world, and could think of no better method than communicating it to your Society; and should you so far approve of this method of raising thorns, as to think me entitled to any honorary reward, I shall receive it with gratitude, but shall feel myself amply repaid for any trouble I have been at, should you think it worthy a place in the next Volume of your Transactions.

The method of raising the Thorns from roots of the plant, is as follows.

I would advise every farmer to purchase a hundred or a thousand thorns, according to the size of his farm, and plant them in his orchard or garden, and when they have attained the thickness of my three-year-old specimens, which is the size I always prefer for planting in fences, let him take them up and prune the roots in the manner I have pruned the specimen sent you, from which he will upon an average get ten

ten or twelve cuttings from each plant, which is as good as thorns of the same thickness ; so that you will easily perceive that in three years he will have a succession of plants fit for use, which he may if he pleases increase ten-fold every time he takes them up.

The spring (say in all April) is the best time to plant the cuttings, which must be done in rows half a yard asunder, and about four inches from each other in the row ; they ought to be about four inches long, and planted with the top one-fourth of an inch out of the ground, and well fastened ; otherwise they will not succeed so well.

The reason why I prefer spring to autumn for planting the roots, is, that were they to be planted in autumn, they would not have got sufficient hold of the ground before the frost set in, which would raise them all from the ground, and, if not entirely destroy the plants,

plants, would oblige the farmer to plant them afresh.

I have attached the produce of my three-year-old specimen to the plants it came from, cut in the way I always practise; on the thick end of the root I make two, and on the other end one cut, by which means the proper end to be planted uppermost, which is the thick one, may easily be known.

Although I recommend the roots to be planted in April, yet the farmer may, where he pleases, take up the thorns he may want, and put the roots he has pruned off into sand or mould, where they will keep until he has leisure to cut them into proper lengths for planting; he will likewise keep them in the same way, until planted.

The great advantage of my plan is: first, that in case any one has raised from haws, a thorn with remarkably large

large prickles, of vigorous growth, or possessing any other qualification requisite to make a good fence, he may propagate it far better and sooner, from roots, than any other way. Secondly, in three years he may raise from roots a better plant, than can in six years be raised from haws, and with double the quantity of roots; my three-year-old specimen would have been half as big again, had I not been obliged to move all my cuttings the second year after they were planted.

It would not be a bad way, in order to get roots, to plant a hedge in any convenient place, and on each side trench the ground two yards wide, and two grafts deep; from which, every two or three years, a large quantity of roots might be obtained, by trenching the ground over again, and cutting away what roots were found, which would all be young and of a proper thickness.

I do

## 84 AGRICULTURE.

I do not like them of a larger size than the specimens sent.

I am at present engaged in several experiments, to endeavour to propagate the thorn from the branches, which, if successful, I will communicate to you; but I am of opinion, that what is now done is sufficient.

Should the Society require any further explanations, I shall be happy in doing my utmost to furnish such explanations.

SAMUEL TAYLOR.

*Moston, near Manchester,*

*May 6th, 1805.*

To the SOCIETY OF ARTS, &c.

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### *A list of the Specimens sent.*

No. 1 consists of four specimens of roots, which were planted the latter end of April, 1804; two with only one shoot a piece, and two with several.

No. 2

No. 2 consists of two specimens of the best one-year-old seedlings I could select out of 40,000 I purchased this spring, which in fact are two years old from the time the haws were gathered; for they generally remain one year in the ground before they vegetate.

No. 3 consists of two specimens of roots, planted the latter end of April, 1803, which have not been moved before since they were first planted; one with only one shoot, and the other with several.

No. 4 consists of the best two-year-old seedlings which I have been able to procure.

No. 5 consists of two specimens of roots, planted the latter end of April, 1802; which I was obliged to remove the spring after I first planted them; this of course retarded their growth, by having fresh roots to make. These spec-

I cimens

cimens are pruned in the way I always prunc thorns, when I plant them in my fences; the roots, you may see, are cut, and the top I should have cut at the mark you will find about four or five inches above the root, and shortened the branches below that mark, to about three inches from the stem. I have attached to each specimen the roots I pruned from it, cut into such lengths as I should have done had I used the thorns myself. I think one produced sixteen and the other twenty-two; but that you will be able to judge of when you see them.

No. 6 consists of the best three-year-old seedlings I could get; but both No. 4 and No. 6 labour under the same inconvenience as No. 2, from the haws remaining in the ground generally one year before they vegetate.

The

The SILVER MEDAL of the Society was this Session voted to Mr. W. WALLIS MASON, of Goodrest Lodge, near Warwick, for his Experiments on the CULTURE of CARROTS. The following ACCOUNT was received from him.

SIR,

THE purport of this communication is to explain with a degree of accuracy, the general, and as far as possible the best method to cultivate carrots. I shall therefore endeavour to set aside those prejudices, which frequently occur in every branch of agriculture; while I give a brief statement of particulars, which experience, assisted by numerous comparisons, has induced me to consider as best for adoption for

I 2 rearing

rearing the plants, as well as most judicious in the application of the vegetables when cultivated. In Suffolk, the culture of this highly valuable root has been carried on for ages; but of late years it has very much increased, and furnishes the best criterion of its worth; various have been the attempts to extend the benefit more generally throughout the kingdom, but with little success; imaginary difficulties arising in the minds of cultivators, which I hope to obviate by a more minute detail, the observance of which will enable any practical farmer, on a proper soil, to raise a crop, which will at once be productive of great private advantage and public utility. On most farms it will be found, that a considerable proportion of the produce from the best land (the meadow and upland pasture) is consumed by the laborious cattle, and the lean and rearing stock during the winter months. The carrot system may be

be carried on, on inferior arable lands, and the produce, by judicious application, will be found to excel far beyond general expectation that of the grazing land, which will in consequence be appropriated to great national advantage, by furnishing an additional supply of animal food, of wool, and the produce of the dairy.

A red loamy sand is at all times to be preferred, as free from stones as possible; but very large crops may be grown on any land, which is not of a too tenacious or binding quality, with sufficient depth of soil.

In order to increase the luxuriance of the root, it is necessary to remove the soil to the depth of 14 inches: this is easily accomplished, by first ploughing the furrow seven inches deep in the usual manner, then follow with the second plough in the same furrow, which, by the assistance of an additional horse, brings up the soil from the depth

I 3 required.

required. The first plough continues to turn the fresh furrow to the bottom of the double furrow, and being followed by the double furrow, as in the first instance, the soil becomes completely mixed and ready for the reception of the seed.

The first furrow is seven inches deep, and is removed into the .....

second furrow, of fourteen inches deep; this in rotation becomes the first stratum.

The lands, or stiches cannot be too wide, from 18 to 25 yards.

It is necessary to observe, the land at all times on which this crop is intended to be produced, should be in a perfectly clean state; a barley stubble which succeeded a fallow, &c. Yet few crops turn out more productive than those cultivated on clover, or lays of artificial grasses; ploughing the same as on a barley stubble.

A rule which in most instances holds good, must not here be neglected, that of getting in the seed directly after the ploughs; a neglect of this would be attended

attended with the worst consequences; on stale land the weeds would, in a short time, completely get the better of the young plants, and thereby occasion a great deficiency in the crop.

Five pounds of seed is commonly sown per acre; but as its value, comparatively speaking, is very trifling with the advantage of a good plant, I never recommend less than six pounds per acre. In a dry season there is a great benefit in steeping the seed for twenty-four hours; to prepare it for the drill, or for sowing, it should be well rubbed with the palm of the hand against the side of a tub, to destroy the small fibres and prevent their adhesion, and a proportion of fine sifted marl and saw-dust mixed with it; the proportion two-fourths marl, one-fourth saw-dust, to one-fourth of seed.

Drilling is indubitably the best way to get in the seed, from six to nine inches asunder: the advantage is obvious; the carrots stand the winter much better:

from the tops of the vegetables being nearly buried in the soil, the green head only is visible to the eye, and it is very rare to see the smallest part of the red carrot above the surface. An additional advantage in this mode of cultivation, is the great facility it furnishes in weeding and hoeing, which, in a district not hitherto acquainted with this useful branch of agriculture, must render it in a twofold degree desirable.

Carrots in the early state are very tender plants, and very slow in growth; I have frequently noticed a field scarcely visible to the eye, three weeks or a month after sowing, which has turned out a most abundant produce. It is frequently six weeks before they are fit to hoe; but to prescribe any rule is impossible, since the vegetation of every description of plants so much depends on the season. I shall only observe, the most proper time to commence weeding or hoeing, is soon after the plants gain the

the parsley leaf, or about half-inch out of the ground. Every vegetable intended to be thinned or separated by the hoe, cannot well be done too early, since from general observation it is clearly ascertained, that the smaller the plants, the greater is the number left; and as a second hoeing is absolutely necessary (if it is only to promote vegetation by loosening the surface), the plants may then be distributed as requisite. In hoeing of every description, it is always necessary to stir every part of the soil possible; in this instance it must on no account be neglected.

The season for sowing, is from the middle of March to the 12th of April. In dry weather it is best to leave the seed rolled down. The land should always be harrowed after drilling or sowing; from the nature of the plant, a pulverization of the soil is requisite. It is, however, useless to detail particulars of this sort, which must in so material

94      AGRICULTURE.

terial a degree depend on the state of the season, in which the judgment of the practical farmer cannot easily fail; suffice it to say, the lighter, the finer, and the less binding the soil, the better vegetation must flourish.

With respect to the best method of cleansing the young crop, I have only to observe, that nine times in ten it answers better to weed by hand, than to hoe the first time; this rests on a supposition, that the crop is much encumbered by weeds; on the contrary, (which is rarely the case) supposing it perfectly clean, the hoe will answer every purpose requisite. There is great judgment to be observed in the first hoeing, particularly to leave the plants sufficiently thick, and not to bury them in the process; should this be done, your fairest prospects will at once vanish. The women and children employed to weed, should not be suffered to pull a single carrot plant; the hoe effects

fects the purpose of setting out in a superior manner, and should within two or three days follow the weeders. I have frequently seen the land so much covered with weeds, that the plant of carrots was extremely doubtful; after hand-weeding, a very good plant was seen, which would have been destroyed in great measure, had the hoe been previously used. One weeding and two hoeings are generally sufficient; by the time they are accomplished, the carrot-tops generally are of sufficient growth to shade the land. The proper hoe to be made use of should be 4 inches, by  $1\frac{1}{2}$  inch of the adjoining Figure, and always kept very sharp.



Carrots

Carrots, like turnips, and other vegetables intended to be housed for winter, should not be taken up before they are full grown; they never answer better than when used from one to four weeks after they are out of the ground. They are little liable to injury in winter; the latest time for taking up, is just before the fibrous roots begin to shoot in the spring; at which period the vegetable becomes less nutritive, at the same time injurious to the land.

By these attentions I have invariably found the cultivation of carrots extremely beneficial to the land, and not unfrequently the value of the crop equal to the fee-simple of it. The greatest produce I ever remember was eighteen loads per acre, forty heaped bushels to the load; yet I have heard of much larger crops.

Worn-out ploughed lands are renewed by the intermixture of fresh soil occasioned by the deep ploughing; and the proof

proof is visible in many succeeding crops of corn, grasses, &c.

The same land will produce very good crops of carrots for years in succession; but in this instance manure becomes necessary. They are taken up with a narrow spade, which the labourer strikes with one hand into the ground, pressing it sideways at the same time; he draws the root with the other, throwing it to the heap, where sit his wife and children to cut off the tops: the tops are left and spread as manure to the land.

*Expenses of Labour.*

	<i>s. d.</i>
Weeding varies from 5s. to 10s. per acre, average	7 6
First Hoeing.....	7 0
Second do. .....	5 6
Taking up per load, and topping .....	1 2

Observing these prices, it is necessary to remark, the labourers, in dear seasons, have an allowance for flour.

To

98        AGRICULTURE.

To every single man one stone of flour per week, the master paying the additional price above two shillings per stone.

To a man and his wife one stone and a half per week, and half a stone per week to every additional child under twelve years old, at which time they are deemed capable of earning their own bread.

By the introduction of this judicious plan, the labourer shares the benefit of that grain which his own industry had helped to cultivate, and feels but in a small degree the oppression of the times ; the interest of the master and the servant becomes reciprocal, for the price of labour continues nearly at the usual standard ; had it been otherwise, the farmer must have suffered when his commodities became of less value.

The annual rent of those lands on which carrots are generally grown, is from 5s. to 20s. per acre ; but I have invariably

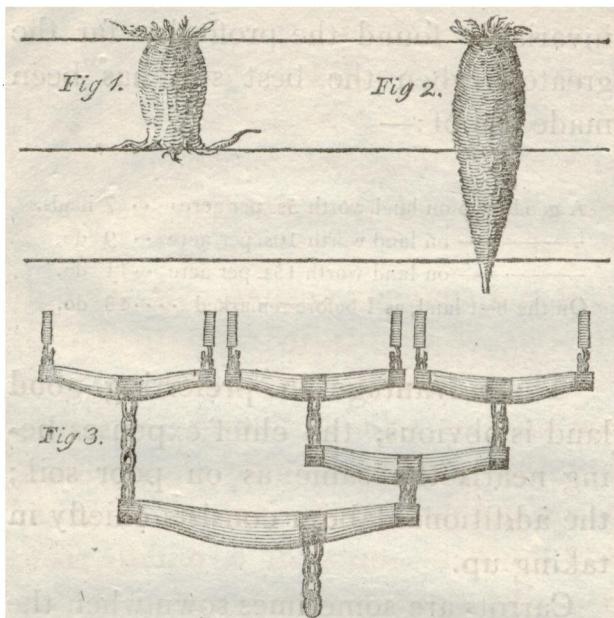
invariably found the profit by far the greatest when the best soil has been made use of:—

A good crop on land worth 5s. per acre.....	7 loads.
——— on land worth 10s. per acre ..	9 do.
——— on land worth 15s. per acre ..	11 do.
On the best land, as I before remarked .....	18 do.

The advantage in preferring good land is obvious, the chief expenses being nearly the same as on poor soil; the additional labour consists chiefly in taking up.

Carrots are sometimes sown when the land has received but a single furrow, a sure badge of indolence. The annexed Drawing is to prove the necessity of deep ploughing, by means of the double furrow. *Fig. 1.* is the shape and comparative size of a carrot grown on a single furrow; the earth below where the soil was stirred, acting as a repellent, checks the growth of the root, and causes it to shoot laterally.

*Fig. 1.*



*Fig. 2* is the comparative growth and shape of a carrot grown on the double furrow. On all soils which are adapted to this branch of husbandry, the first ploughing may be done by a pair af horses abreast; the lower, or double furrow, by three horses abreast. The nearer the cattle are to the work, the greater the purchase; they labour with greater spirit in sociable pairs than in a drone-

a drone-like string at length. The adjoining *Fig. 3* will explain the manner of fixing three horses abreast to a single purchase, which will be found on a fair trial to equal four horses at length.

It is a common custom with the cultivators of carrots to raise their own seed: it requires little attention, and the crop is seldom known to fail.— For this purpose choose such carrots as are in no respect injured by frost; and the handsomest of a middle size; trim the green top, leaving about an inch of it, and cut two inches off the extremity of the root. Plant them in double rows, a foot wide, and six inches in the row; the interval of the double rows three feet: this is requisite, as the seed does not ripen together. The path or interval serves to gather the seed, which must be done daily as the heads of seed arrive at maturity: it is frequently three weeks before the crop is

K cleared

cleared. Spread the heads of seeds to dry on a floor, or in dry weather, on the ground; afterwards separate the seed from the stalks with a comb. The season to plant carrots for seed, is the latter end of February or the beginning of March, when the severe frosts are over.

Having explained, in as concise a manner as possible, what is necessary to be observed, to enable the practical farmer to cultivate this highly valuable root, in districts hitherto deprived of the great benefit it affords to the community, and the great profit to the cultivator, free from all theoretical and speculative opinions, I proceed to a short detail of the use and application of carrots when cultivated. On their utility for family consumption, it will not be necessary to dwell; I have therefore only to remark, since vegetables are found to be more or less nutritive in proportion to the saccharine matter they

they contain, but few vegetables will be found to excel them. I have known large crops of carrots sold, for the London market, at forty shillings per load, delivered at a port four miles distant from the land, which produced them a price for which a ready sale will be found in any populous town, during the winter season: for this purpose they should be assorted; all the over-grown and crooked ones reserved for home consumption, for which they will answer as well as the others; and when topped, half an inch of the green crown left on: for this purpose they are not usually washed. For home consumption I have invariably found them to answer best for the use of cart-horses; when designed for the food of other cattle, of any description, the green top must be entirely cut off, and the carrots washed perfectly free from dirt and sand. It is necessary to house them three or four days at least before

K 2 horses

horses are fed with them; a neglect of this is sure to be attended with dangerous consequences. It is generally known that the cucumber, when left a short time in water, absorbs a proportion of it; the carrot does the same, in a less degree, yet sufficiently to produce a considerable degree of fermentation by the heat of the animal's stomach; and griping is occasioned thereby. To render them salutary, the time mentioned is sufficient for evaporation.— Washing is easily and expeditiously done, by putting a large mash-tub, three parts full of carrots, then pouring cold water on them, stir them, and throw them out with four-pronged muck-forks; after which process they may be laid under cover in large heaps, as much as six or eight loads in a heap; secured from frost and rain, they will keep two or three months: it is however not right to suffer them to remain so long, in which case they shrivel even to

to two thirds of measure ; and although they become more nutritious, from the loss of aqueous particles, it is not sufficient to compensate the deficiency. Carrots are extremely valuable when applied as food for cart-horses : when properly fed with them, they are in the greatest vigour and health ; and their coats are as fine as the best-groomed coach-horses, even in the depth of winter, and exposed to the inclemency of the season in a straw-yard. For home consumption, I have invariably found them to pay more, by one-third, when given to horses, than to feeding cattle. After a variety of experiments, I have found the following manner of applying them to be the best :—To each cart-horse, one heaped bushel per day, with as much cut provender as he could eat ; the latter should be of the first quality. I recommend two-thirds good wheat or oat straw, and one-third clover. Wheat-straw is best ; oat-straw

next. Barley-straw is frequently given; but never preferred, from its griping tendency. Horses cannot eat too much cut food. When returned from work, they should always be baited with it, or drink their water before carrots are given, and plenty of dry food given with the carrots: the dry nature of the one corrects the cold quality of the other. There is not any occasion to cut the carrots, but to mix them with the cut food, and feed them in the manger. Horses used to carrots will prefer them to oats, when given together. If the straw and clover are not of the first quality, oats should be given in proportion. By this method of feeding, there is a saving of at least two-thirds of the hay usually consumed; corn is dispensed with; and horses will be in better condition than when fed with hay and corn only, supposing each horse is allowed with hay half a peck of oats per day.

Great

Great care must be taken never to give carrots when horses come to the stable heated by work.

Carrots are not proper food for riding-horses ; nimble exercise causes them to be laxative ; and as they will sometimes produce griping, I shall insert a prescription which has been proved by long experience, together with the treatment to be pursued in such cases.

Oil of Turpentine .....	1 oz.
Castile Soap .....	1 oz.
Flour of Mustard .....	½ oz.

On the first symptom this mixture should be given, and it will not fail to remove the complaint. The Castile soap to be cut fine, and dissolved in a quart of boiling water, the mustard added ; the oil of turpentine the last thing ; it should be given more than milk-warm ; if the animal suffers much pain, add half an ounce of liquid laudanum. On the first appearance of the disease,

the horse should be well coated, and constantly rubbed with hard twisted whisps of straw, and kept as warm as possible; should the disease increase, and the body swell much, a gallon of blood should be taken, to check the inflammation, and give time for the medicine to operate. If the symptoms increase, repeat the dose, omitting the liquid laudanum. Clysters and raking afford much relief when the symptoms first appear, and frequently remove the complaint.

Feeding cattle improve more on carrots, than when fed with potatoes or turnips; they are excellent food for ewes at lambing time, and should be cut, or they are subject to break their mouths.

Store pigs may be fattened on carrots only, and large hogs feed remarkably well, when fed with half corn and half carrots.

Heifers

Heifers in calf, which require good keep and calve early, thrive better on carrots and good oat straw, than on hay only—one bushel of carrots per day—care must be taken not to give them too early or too many; in which case, the calves are liable to overgrow.

Weaned calves thrive well on this food; a peck per day is quite sufficient, more would increase the body too much.

Milking cows give more milk on carrots and straw, than on hay only. In all these instances their superiority over turnips is more, comparatively speaking, than the difference of a carrot crop rated at one guinea per load of forty bushels, to the value of turnips on the same soil; rating them as a produce for home consumption.

One heaped bushel of carrots, therefore, is equal to 18 lbs. of hay. Admitting each cart-horse to consume this quantity

## 110. AGRICULTURE.

quantity of hay for 120 days, it amounts to 2,160 lbs. the average produce of one acre of good pasture land.

The same animal, if fed on carrots, with the addition of the cut-straw provender, which is a substitute for corn, and adds solidity to the carrots, will require only 120 bushels of carrots, or three loads; not half the produce of an acre of arable land worth five shillings per acre.

To this must be added the great superiority in point of condition, which the cattle evince. The latter method of feeding with carrots and cut provender, is fully equal to 18lbs. of hay and half a peck of oats to each horse.

My object in presenting the above remarks, for the consideration of the Society for the Encouragement of Arts, &c. &c. is the hope of extending a most valuable branch of Agriculture (which has

AGRICULTURE. 111

has long stood the test of experience) more generally throughout the kingdom, and is respectfully submitted to them by their obedient servant,

W. WALLIS MASON.

*Goodrest Lodge, near Warwick,*

*January 31st, 1805.*

CHARLES TAYLOR, Esq.

The

The SILVER MEDAL of the Society was  
was this Session voted to Mr. JOHN  
FAREY, No. 12, Upper Crown-street,  
Westminster, for Experiments on the  
GROWTH of TIMBER TREES. The  
following Communications were re-  
ceived from him.

A PLAN of the Plantation referred to,  
called Brown's Wood, is hereunto  
annexed, and is the plantation de-  
scribed as 19 acres, in the First Volume  
of the Society's Transactions, p. 133.

SIR,

IN the year 1778, Mr. Francis Moore,  
of Aspley-Guise, in Bedfordshire,  
planted four pieces of sandy land with  
Scotch, and a few other fir plants,  
plans of which were laid before the  
Society of Arts, &c. with certificates in  
the usual form, and the Gold Medal  
adjudged

adjudged to Mr. Moore for these Plantations. Accounts thereof are preserved in the First Volume of the Society's Transactions. Several circumstances concurred in the year 1794 to induce me, with the approbation of the late Duke of Bedford, to whom two of these plantations then belonged, to have all the trees growing in one of the plantations in Wavendon carefully counted, measured, and valued, in order to determine by an accurate and large experiment, the actual growth and improvement in this plantation, at the distance of sixteen years from its being planted.

In order to deduce several different averages, a new and very accurate plan of this plantation was made, and of five several parts into which it was divided. Conceiving that these particulars may prove interesting and useful to gentlemen concerned in planting, or who wish to make calculations on such improve-

114 AGRICULTURE.

improvements, I have drawn out a detailed account of these operations, with remarks referring to a plan of this plantation, which I beg to submit to the consideration of the Society; in hope that they will give the same a place in their next Volume of Transactions, together with a re-measurement of one of those divisions of the plantation, to record the progress of the trees therein, at twenty-six years from their planting; for which last particulars, I am indebted to my friend, Mr. Robert Salmon, of Woburn Park, who will probably at a future period furnish you with further remarks of considerable utility, on the progress and management of this and other young plantations.

I am, Sir,

Your obedient servant,

JOHN FAREY.

12, *Upper Crown-street, Westminster,*  
*May 1st, 1805.*

Mr. CHARLES TAYLOR.

*Reference*

The Plan of a Plantation called  
*BROWNS WOOD*,  
in the Parish of Wavendon Bucks,  
24 Miles from Woburn in Bedfordshire.  
The Property of  
HIS GRACE THE DUKE OF BEDFORD.

Scale of Chains.

0 1 2 3 4 5

The Common Heath of Apley Guise, in the County of Bedford.

Contents			A. R. P
A.....	0	0	21
B.....	3	3	27
C.....	0	2	25
D.....	3	2	33
E.....	1	2	33
<i>Buildings</i> .....	0	0	35
<i>Bog</i> .....	0	0	20
<i>Fences</i> .....	0	2	17
			11, 0, 13

*Reference to the ENGRAVING of the PLANTATION, called Brown's Wood, in the parish of Wavendon, Bucks, with Mr. FAREY's remarks thereon. See Plate II.*

SIR,

BEFORE entering on the measurement and other observations, which I beg to have the honour of submitting to the Society of Arts, &c. relative to a plantation in Wavendon, I beg leave to mention some circumstances which led to these inquiries on my part.

I was one among a number of other persons of the neighbourhood of Aspley-Guise, a village on the western border of Bedfordshire, whom Mr. Francis Moore invited to meet him on the 8th of March, 1794, to inspect his plantations, and other improvements; and

and I accordingly accompanied Mr. Moore and five other gentlemen through several of the plantations which he had made: it was particularly stated to us by Mr. Moore, while we were viewing a plantation of firs in Wavendon parish, Bucks, called *Brown's Wood*, that this was one among the plantations for which he was honoured with the gold medal in the year 1779, from your very excellent and useful Society. The particulars of the time of planting, ages of the plants, &c. he stated to us from a book then in his hands, and shewed us five or six trees in Brown's Wood, which had been recently marked and numbered, of which trees he stated the dimensions and value; informing us, that the same had been measured and ascertained a few days before, by Mr. Malcolm, who was then collecting materials for his Report to the Board of Agriculture on the county of Buckingham. From the terms of our invitation, and the

the nature of Mr. Moore's conversation as we passed through his plantations, I expected that he had some report prepared, to be presented to your Society, or to the Board of Agriculture, on the progress and value of these plantations, and to which he wished our certificates; we separated, however, without any such thing being produced or mentioned; but an idea was from that time imprinted strongly on my mind, of the utility of periodical and accurate inspections, to note the growth and increasing value of plantations like these, especially of such, whose planting has been recorded and honoured by the notice of so respectable a body as your Society. Soon after this, *Mr. Malcolm's Agricultural Report on the county of Bucks* was published, in which, at pages 41 and 42, and 52 to 54, there is an account of this plantation; and of your Society having honoured the owner with a gold medal; and this determined

L me,

me, with the approbation of *his Grace the Duke of Bedford*, to have all the trees in Brown's Wood, which then belonged to his Grace, and was under my care, carefully counted and measured, and to keep thenceforward an exact account of all the thinnings, or produce from it, and to repeat the counting and measuring, at intervals of eight or ten years, or oftener. Although circumstances have prevented the full accomplishment of my intentions on this subject, I hope that the following account of the measurements of the trees growing in this wood in 1794, may not be unacceptable to your Society; and I have detailed the methods which I took, from a hope it may stimulate others to furnish you with accurate and periodical measurements of the trees in some of the plantations, whose origin has been stated in the volumes of your Transactions; being convinced, that much good would result from the publication at

at length, of a number of such particulars, in ascertaining the best procedure in thinning and managing young plantations, and of the comparative value of different kinds of trees; besides furnishing accurate data or averages, for estimating the value of other similar plantations, without the great labour of measuring the whole.

Having procured a *measuring tape*, prepared with oil colours (such as are now made by Mr. Cary, optician, in the Strand, for measuring timber), having inches on one side, numbered on from one to ten, twenty, thirty, &c. without beginning again at the end of each foot, its other side being divided into feet and quarters of feet; having also provided a small tin kettle with a quantity of whiting and size, prepared as for white-washing, and a painter's brush; a book ruled from top to bottom into columns, each about half an inch wide, being also in readiness;—on the 15th of

L 2

July,

July, 1794, I caused the measurement to be begun by a man and two boys. This man, who then resided at Bowbrick-hill, is named *James Smith*, a very steady and competent person: his business was to take the circumference of each tree, at the height of four feet from the ground, which height was readily ascertained by a particular button or mark on his waistcoat. One of the boys constantly attended on one side of him with the book, and, as soon as he called out the inches which the tree girted, wrote it down; the other boy, advancing on the other side, immediately made a stroke of whiting around the tree, about the place that had been measured; this was for distinguishing those trees which had been measured. On the second day I directed that such of the smaller trees as were found not to exceed four inches in circumference, at four feet high, should have their height measured instead of their circumference, for

for which purpose the man held the ring of the tape to the extreme branch or leader of the tree; and when this was above his reach, using a stick, with a hook or notch in its end to receive the ring of the tape to hold it up by, while one of the boys stretched the tape to the ground and read off the feet, which were regularly entered by the other boy one under another, in the book, along with the girts, only distinguishing these by the letters *ft.* after them; this was done to prevent the trouble and risk of mistake, in having different columns in use at the same time; every alternate column was also left blank for room to note the kinds of trees (except the Scotch firs, of which the plantation principally consisted) by the words, *Spruce, Pine, Larch, &c.* after the girt. The planting in Brown's Wood being divided by ridings or ditches, into five distinct pieces, in order to render the experiment more complete, I directed

each one of these in succession to be completed, and the accounts of each to be distinguished in the book.—I attended frequently to see that my orders were observed, and in a few days the whole wood was got through; the account extending to twenty pages of foolscap paper. I now determined upon dividing the trees into *classes*, according to their girts, calling all those which girted five, six, seven, eight, &c. inches (at four feet high) the fifth, sixth, seventh, eighth, &c. classes; and, having prepared a sheet of paper with columns and room for the dimensions of five or six trees in each class, on the 30th of July I went to Brown's Wood, and Smith assisted me in measuring one hundred and eight trees, which we performed with every regard to accuracy, in four hours and a half. Our method of selecting the trees was, in walking through the wood in different directions, to select a tree out of several others near it,

it, to which it appeared similar in growth and size: the tree so selected, was girted at four feet, to refer it to its proper class, and it was then measured, by help of a ladder and a slight pole or rod, to elevate the ring of the *length tape*, to such a height in the tree as it could be used, if cut down, either for rafters of slight buildings, for rails, or for stakes in temporary fences, &c.: in this I was governed by our custom of cutting off the top of the thinnings of this, and similar plantations for sale. The tape being held, I stretched it to the ground, and read the feet from the *black* side thereof, which I took down on the sheet of paper in the column for lengths, under the proper class; Smith, being at the same time upon the ladder, without lowering or altering the position of the tape, looked for the same figure on the *red* side of the tape, which I had read, and which was called out to him, and level with, or opposite

L 4 thereto,

thereto, he found the proper girting place, or middle of the length to be measured of the tree. After handing the pole down, Smith took the circumference at that place with the tape first mentioned, and read the inches which I wrote down against the length. The *girt tapes*, also made by Cary, are calculated to take the quarter girt at once, which is a great saving of time in measuring large timber; but in an experiment on such small trees as these, to avoid so many fractions, it is better to use the *inch tape*. The nearest foot in the heights, and inch in the circumferences, were set down, rejecting or adding the fractional part when less than half a foot or inch; and I made no allowance for the bark of the trees, it not being usual with us to do so, in selling similar fir-trees to these, from the thinning of plantations here. I should remark, that when Smith on the 15th of July began: the girts of such trees as measured two,  
three,

three, and four inches round (at four feet high) were set down, but on considering next day the minuteness of the solid contents of such trees, we went back and measured the extreme heights of several of these trees, and found them to average seven, nine, and eleven feet respectively, and after that the heights of such trees were set down as before mentioned, instead of their girt; such as were above six and a half, and did not exceed eight feet in height, were set down seven; such as measured between eight and ten were set down nine; and those between ten and twelve, were set down eleven; which is the reason that no eight and ten feet heights appear in the following abstracts. In order that the Gentlemen of your Society may be able to judge, how nearly I have obtained a correct average content of the trees in each class, I have below copied the whole of the dimensions which were taken.

## DIMENSIONS

126 AGRICULTURE.

DIMENSIONS of 108 TREES growing in Brown's Wood  
Plantation, 30th July, 1794.

Class, or circumference at four feet high.	Height measured in feet.	Whole girt in the middle, in inches.	Contents in feet and duodecimals	Mean contents in feet; observations, &c.
4th	8	4	$\frac{8}{1\frac{1}{4}}$	11 feet high mean $\frac{7}{1\frac{1}{4}}$
	7	4	$\frac{7}{1\frac{1}{4}}$	
	6	4	$\frac{6}{1\frac{1}{4}}$	
5th	11	4	$\frac{11}{1\frac{1}{4}}$	a pine mean $\frac{1}{12}$
	7	5	$\frac{7}{1\frac{1}{4}}$	
	6	6	$\frac{6}{1\frac{1}{4}}$	
	8	5	$\frac{8}{1\frac{1}{4}}$	
6th	8	7	$\frac{8}{1\frac{1}{4}}$	a spruce mean $\frac{9}{12}$
	8	6	$\frac{8}{1\frac{1}{4}}$	
	11	6	$\frac{11}{1\frac{1}{4}}$	
	10	6	$\frac{10}{1\frac{1}{4}}$	
	11	6	$\frac{11}{1\frac{1}{4}}$	
	7	6	$\frac{7}{1\frac{1}{4}}$	
7th	15	6	$\frac{15}{1\frac{1}{2}}$	mean $\frac{31}{12}$
	16 $\frac{1}{2}$	6	$\frac{16\frac{1}{2}}{1\frac{1}{2}}$	
	12	6	$\frac{12}{1\frac{1}{2}}$	
	10	7	$\frac{10}{1\frac{1}{2}}$	
	10	7	$\frac{10}{1\frac{1}{2}}$	
	12	6	$\frac{12}{1\frac{1}{2}}$	
	12	7	$\frac{12}{1\frac{1}{2}}$	

DIMENSIONS

DIMENSIONS of 108 TREES growing in Brown's Wood  
Plantation, 30th July, 1794, continued.

Class, or circumference at four feet high.	Height measured in feet.	Whole girt in the middle, in inches.	Contents in feet and duodecimals	Mean contents in feet; observations, &c.
8th	19 $\frac{1}{2}$	6	$\frac{4}{12}$	
	10 $\frac{1}{2}$	8	$\frac{3}{12}$	
	12	7	$\frac{8}{12}$	
	12	7	$\frac{3}{12}$	mean $\frac{3}{12}$
9th	18	7	$\frac{5}{12}$	
	21	7	$\frac{6}{12}$	
	13	8	$\frac{4}{12}$	
	15	7	$\frac{4}{12}$	a pine
	16	7	$\frac{4}{12}$	
	14	8	$\frac{5}{12}$	mean $\frac{4}{12}$
10th	20	8	$\frac{7}{12}$	
	17	9	$\frac{7}{12}$	
	12	10	$\frac{6}{12}$	
	15	9	$\frac{6}{12}$	
	15	9	$\frac{6}{12}$	mean $\frac{6}{12}$
11th	17	9	$\frac{7}{12}$	
	22	9	$\frac{8}{12}$	
	24	9	$\frac{9}{12}$	
	15	10	$\frac{8}{12}$	mean $\frac{8}{12}$
12th	15	9	$\frac{6}{12}$	
	22	9	$\frac{9}{12}$	
	14	10	$\frac{7}{12}$	
	15	10	$\frac{8}{12}$	mean $\frac{8}{12}$
13th	15	10	$\frac{8}{12}$	
	17	11	$\frac{11}{12}$	
	17	11	$\frac{11}{12}$	a pine
	15 $\frac{1}{2}$	11	$\frac{10}{12}$	
	15	11	$\frac{9}{12}$	mean $\frac{10}{12}$

## DIMENSIONS

128 AGRICULTURE.

DIMENSIONS of 108 TREES growing in Brown's Wood  
Plantation, 30th July, 1794, continued.

Class, or circumference at four feet high.	Height measured in feet.	Whole girt in the middle, in inches,	Contents in feet and duodecimals	Mean contents in feet; observations, &c.
14th	17	11	$1\frac{1}{2}$	mean 1
	20	10	$1\frac{9}{12}$	
	17	12	1	
	16	13	$1\frac{2}{12}$	
	14	13	1	
15th	18	13	$1\frac{4}{12}$	a pine mean $1\frac{4}{12}$
	22	12	$1\frac{5}{12}$	
	14	14	$1\frac{2}{12}$	
	25	11	$1\frac{4}{12}$	
	20	13	$1\frac{6}{12}$	
	17	13	$1\frac{3}{12}$	
16th	18	13	$1\frac{4}{12}$	{ No, 2, near N.E. { corner mean $1\frac{5}{12}$
	17	13	$1\frac{3}{12}$	
	21	11	$1\frac{1}{12}$	
	21	14	$1\frac{2}{12}$	
	14	15	$1\frac{4}{12}$	
	23	13	$1\frac{8}{12}$	
	16	14	$1\frac{3}{12}$	
	18	13	$1\frac{3}{12}$	
17th	23	13	$1\frac{8}{12}$	mean $1\frac{7}{12}$
	24	13	$1\frac{9}{12}$	
	16	15	$1\frac{7}{12}$	
	22	13	$1\frac{7}{12}$	
	22	13	$1\frac{7}{12}$	
18th	19	13	$1\frac{5}{12}$	a pine mean $1\frac{8}{12}$
	21	13	$1\frac{7}{12}$	
	21	15	2	
	15	16	$1\frac{8}{12}$	
	19	14	$1\frac{8}{12}$	

DIMENSIONS

AGRICULTURE. 129

DIMENSIONS of 108 TREES growing in Brown's Wood Plantation, 30th July, 1794, continued.

Class, or circumference at four feet high.	Height measured in feet.	Whole girt in the middle, in inches.	Contents in feet and duodecimals	Mean contents in feet; observations, &c.
19th	17 $\frac{1}{2}$ 17 23 15 $\frac{1}{2}$ 13	16 15 16 14 18	1 $\frac{1}{2}$ 1 $\frac{3}{8}$ 2 $\frac{1}{2}$ 1 $\frac{4}{9}$ 1 $\frac{9}{12}$	mean 1 $\frac{1}{2}$
20th	23 25 12 25 14 15	16 14 18 15 17 16	2 $\frac{7}{12}$ 2 $\frac{1}{2}$ 1 $\frac{3}{8}$ 2 $\frac{1}{2}$ 1 $\frac{9}{8}$ 1 $\frac{8}{12}$	at S.E. corner mean 2
21st	21 23 24 16 20 12	14 16 16 18 17 19	1 $\frac{9}{12}$ 2 $\frac{7}{12}$ 2 $\frac{1}{2}$ 2 $\frac{1}{2}$ 2 $\frac{1}{2}$ 1 $\frac{10}{12}$	mean 2 $\frac{4}{9}$
22d	20 $\frac{1}{2}$ 22 21 24	16 17 18 17	2 $\frac{3}{12}$ 2 $\frac{9}{12}$ 2 $\frac{11}{12}$ 3	{ No. 1, at W. corner of C mean 2 $\frac{9}{12}$
23d	19 24 20	19 18 18	3 3 $\frac{4}{12}$ 2 $\frac{10}{12}$	mean 3
24th	17 20 25 19	17 18 18 19	2 $\frac{2}{12}$ 2 $\frac{10}{12}$ 3 $\frac{6}{12}$ 3	mean 2 $\frac{10}{12}$
26th	14 11	24 23	3 $\frac{6}{12}$ 2 $\frac{6}{12}$	outside, top broken N.E. corner, ditto mean 3
27th	21	21	4	outside, top broken

It

It may not be amiss, to mention the mode of calculation when the circumference is taken in inches, instead of the *one-fourth girt* to which the tables and slide-rules in use are adapted, viz. Square the girt, or multiply it by itself; multiply this by the feet in length, and divide the product by 2304\*, the quotient is the content: thus, in the first tree in the 20th class  $(16 \times 16 \times 23) \div 2304 = 2$ , with 1280 remaining, and  $(1280 \text{ multiplied by } 12) \div 2304 = 7$ ; the contents therefore is  $2\frac{7}{12}$  feet. The remaining business was done by Smith and my brother, Benjamin Farey, in my office at Woburn. The original book was first carefully looked over, and all the figures which had *ft.* against them were circled round with a pencil, to distinguish them; so were the *spruce*,

\* Because the girt is four times too much before squaring, and 144 square inches make a foot, therefore  $4 \times 4 \times 144 = 2304$  is the divisor for reducing to the customary or *round measure*. See a paper on this subject in *Tilloch's Phil. Mag.* No. 75, vol. xix. page 213.

*pine,*

*pine, larch, &c.* A paper was then ruled into upright columns, about a quarter of an inch wide, and on the top, the classes 5th, 6th, 7th, 8th, &c. were written; a person then read over the girt of the Scotch firs, while another marked with a pencil each time under the proper class; in this way they proceeded till a page of the original book was got through, or till they had come to the end of one of the five divisions of the wood; the number of marks under each class were then counted, and set down under each other regularly; in like manner the small Scotch firs of 1, 2, 3, 4, &c. feet high were separately collected, and set down under the proper classes. The trees of other kinds in that page were then collected into classes, and the small ones arranged and added, and the whole were added to the Scotch firs; the total number of trees in that page of the original book was then counted, and if

it

it did not agree with the collected total, the whole was gone over again; and thus each page was proved to be rightly collected. The above totals were then collected from each page on a sheet of paper, ruled and entitled as in the following abstracts, and the totals when collected for each division of the wood, and kind of tree, stood as in the following pages opposite.

The number of *Scotch firs* in the 5th, 6th, 7th, &c. classes were then collected in succession, from each of these four abstracts; the same was done for the *spruce*, *Weymouth pines*, and *larch*; and in order to ascertain the measure or cubic contents of the trees which had been measured, in each class of the different kinds, the four following Tables were drawn out.—The numbers in the column entitled “Feet per Tree,” being taken from the measurement of the 108 trees before given.

## I. CALCUL.

AGRICULTURE. 133

I. CALCULATIONS of SCOTCH FIRS.				II. CALCULATIONS of SPRUCE FIRS.			
Class.	No. of Trees.	Feet perTree	Contents	Class.	No. of Trees.	Feet perTree	Contents
5	1490	1 $\frac{1}{2}$	124	5	11	1 $\frac{1}{2}$	1
6	1475	1 $\frac{2}{3}$	245 $\frac{1}{2}$	6	5	1 $\frac{2}{3}$	1
7	1784	2 $\frac{1}{2}$	371 $\frac{1}{2}$	7	3	2 $\frac{1}{2}$	1 $\frac{1}{2}$
8	1783	3 $\frac{1}{2}$	445	8	3	3 $\frac{1}{2}$	1 $\frac{1}{2}$
9	1677	4 $\frac{1}{2}$	628 $\frac{1}{2}$	9	3	4 $\frac{1}{2}$	1 $\frac{1}{2}$
10	1648	6	824	10	—	6	—
11	1376	8	802 $\frac{1}{2}$	11	1	8	1 $\frac{1}{2}$
12	1091	9	818	12	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$
13	765	10	637 $\frac{1}{2}$	Total	27	—	5
14	491	1	491				
15	312	1 $\frac{1}{2}$	416				
16	206	1 $\frac{5}{6}$	291 $\frac{1}{2}$				
17	152	1 $\frac{7}{8}$	240 $\frac{1}{2}$				
18	88	1 $\frac{8}{9}$	146 $\frac{1}{2}$				
19	65	1 $\frac{10}{11}$	119				
20	44	2	88				
21	20	2 $\frac{4}{11}$	46 $\frac{1}{2}$				
22	12	2 $\frac{9}{11}$	33				
23	7	2 $\frac{10}{11}$	19 $\frac{1}{2}$				
24	6	3	18				
26	4	3	12				
27	1	4	4				
Total	14497	—	6822				

M

III. C A L -

134      AGRICULTURE.

III. CALCULATIONS of WEYMOUTH PINES.				IV. CALCULATIONS of LARCH TREES.			
Class.	No. of Trees	Feet perTree	Contents	Class.	No. of Trees.	Feet perTree	Contents
5	13	1 $\frac{1}{2}$	1	5	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$
6	9	1 $\frac{2}{3}$	1 $\frac{1}{3}$	6	1	1 $\frac{2}{3}$	1 $\frac{2}{3}$
7	2	2 $\frac{1}{3}$	1 $\frac{1}{3}$	7	—	2 $\frac{1}{3}$	—
8	11	3	2 $\frac{1}{2}$	8	—	3	—
9	5	1 $\frac{1}{2}$	2	9	—	1 $\frac{1}{2}$	—
10	3	6	1 $\frac{1}{2}$	10	2	6	1
11	3	1 $\frac{1}{2}$	1 $\frac{1}{2}$	Total	4	—	1 $\frac{3}{2}$
12	3	1 $\frac{2}{3}$	2				
13	3	1 $\frac{1}{2}$	2 $\frac{1}{3}$				
14	3	1	3				
15	4	1 $\frac{4}{12}$	5				
16	—	1 $\frac{5}{12}$	—				
17	—	1 $\frac{7}{12}$	—				
18	2	1 $\frac{8}{12}$	3 $\frac{1}{2}$				
19	1	1 $\frac{10}{12}$	2				
Total	62	—	28 $\frac{1}{4}$				

I. An

I.—An Abstract of the *Scotch Fir* Trees which were grown marked A on the plan annexed, at the south-west corner (Bedfordshire), on the north-west by a fence against a broad straight Riding which points to Bowbrick-hill st

	5	6	7	8
Number of Scotch Firs.	2	9	16	21

\* Note. I have drawn my Plan (which is preserved in the Society's collection, the Society in 1779, and have given it a similar position for more ready comparison south; but, from the vicinity of this Wood to that conspicuous and well-known object

II.—An Abstract of the *Scotch Firs, Spruce Firs, Weymouth Pines* Wood marked B, containing 3A. 3R. 27P. bounded on the north-west by a broad straight Riding leading to Bowbrick-hill Church, east in a curved line by the Riding, or cart-way, up the

Kinds of Trees.	Heights of Small Trees in Feet.										5	6
	1	2	3	4	5	6	7	9	11			
Number of												
Scotch Firs .....	2	11	50	109	142	241	593	778	875	821	685	
Spruce Firs .....	2	..	3	1	2	..	2	1	2	1	..	
Weymouth Pines	..	..	..	..	1	2	3	2	3	4	..	
Larch .....	2	..	3	1	..	..	..	..	..	..	..	
Beech .....	..	1	2	4	4	1	..	..	1	..	..	
Birch .....	..	..	..	..	..	..	1	—	..	..	..	
Totals .....	6	12	88	115	149	244	599	781	881	826	685	

## A G R I C U L T U R E.

ch were growing, in July 1794, on the small triangular par  
south-west corner \*, bounded on the south-west by a fence  
against a young plantation of the Duke of Bedford's i  
wbrick-hill steeple.

Classes of Measured Trees.

5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2	9	16	21	23	19	32	27	23	12	13	9	8	4	3	3

iety's collection, the annexed Plate being a diminished copy thereof), on a scale to m  
ore ready comparison therewith. I have also described the pieces agreeable to his  
d well-known object *Bowbrick-hill Church*, it may easily be found even by a stranger,

*Firs, Weymouth Pines, Larch, Beech, and Birch Trees*, grow  
. bounded on the south by a fence against the common  
-hill Church, on the west by the fence against a plantatio  
rt-way, up the vale in Brown's Wood.

Classes of Measured Trees.

9	11	5	6	7	8	9	10	11	12	13	14	15	16	17	18
78	875	821	685	740	608	532	462	418	360	248	183	106	60	51	15
1	2	1	..	..	1	1	..	..	..	..	..	..	..	..	..
2	3	4	..	1	1	..	..	..	..	..	..	1	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
81	881	826	685	741	610	533	462	418	360	248	183	107	60	51	15

triangular part of Brown's Wood, containing 0A. 0R. 21P. bounded by a fence against the common heath of Aspley (in the parish of Bedford's in Wavendon, and on the north-east by the

	18	19	20	21	Total Number of Trees.
3	4	3	3	3	227

of), on a scale to match as near as may be, with the Plan which Mr. Moore delivered to agreeable to his east point, which however inclines very considerably towards the even by a stranger, without a guide.

*h* Trees, growing, in July 1794, in the division of Brown's the common heath of Aspley, on the south-west by the st a plantation in Wavendon, and on the north-east and

sured Trees.											Number of Small Trees.	Number of measured Trees.	Total Number of Trees.
15	16	17	18	19	20	21	22	23	24				
06	60	51	15	14	8	4	3	1	1	2831	5320	8151	
...	...	...	...	...	...	...	...	...	...	13	3	16	
1	...	...	...	...	...	...	...	...	...	11	7	18	
...	...	...	...	...	...	...	...	...	...	6	....	6	
...	...	...	...	...	...	...	...	...	...	13	....	13	
...	...	...	...	...	...	...	...	...	...	1	....	1	
07	60	51	15	14	8	4	3	1	1	2875	5330	8205	

### III.—An

III.—An Abstract of the *Scotch Firs*, *Spruce Firs*, *Weymou*  
Wood marked C, containing 0A. 2R. 25P. (exclusive o  
on the south by a fence against the common heath of A

Kinds of Trees.	Heights of Small Trees in Feet.									
	4	5	6	7	9	11	5	6	7	8
Number of Scotch Firs .....	..	5	2	10	7	7	7	7	12	18
Spruce Firs .....	..	2	1	1	1	3	4	3	1	..
Weymouth Pines .....	..	..	..	4	6	2	5	5	..	6
Larch .....	..	3	1	1	..	..	1	1	..	..
Beech .....	16	19	5	4	2	..	..	..	..	..
Birch .....	..	..	..	..	1	1	..	..	..	..
Totals .....	16	29	9	20	17	13	17	16	13	24

IV.—An Abstract of the *Scotch Firs*, *Spruce Firs*, *Weymou*  
Wood marked D, containing 3A. 2R. 53P. bounded or  
south-west by the riding and cart-way, on the west by t  
north by a fence against an ancient but now disused l  
of the fosse of a very ancient fortification or camp cal  
Wavendon.

Kinds of Trees.	Heights of Small Trees in Feet.										5
	1	2	3	4	5	6	7	9	11	..	
Number of Scotch Firs .....	1	..	3	19	45	12	173	230	373	478	478
Spruce Firs .....	3	..	..	3	4	..	4	4	9	4	4
Weymouth Pines .....	..	..	..	..	2	..	1	..	..	..	3
Larch .....	2	2	2	2	1	..	..	..	..	..	..
Beech .....	..	..	..	..	..	..	..	..	..	..	..
Birch .....	..	..	..	..	..	..	..	..	..	1	..
Total .....	6	2	5	23	52	12	181	234	383	485	..

## A G R I C U L T U R E.

*Firs, Weymouth Pines, Larch, Beech, and Birch* Trees growing  
 (exclusive of the morass or patch of unproductive bog on  
 heath of Aspley, on the west by the riding or cart-way, a

Classes of Measured Trees.																		
5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		
7	7	12	18	19	29	44	39	56	50	59	45	50	38	30	22	1		
4	3	1	..	2	..	1	1	..	..	..	..	..	..	..	..	..		
5	5	..	6	2	1	3	2	3	3	3	..	..	2	1	..			
1	1	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
7	16	13	24	23	32	48	42	59	53	62	45	50	40	31	22			

*Firs, Weymouth Pines, Larch, Beech, and Birch* Trees growing  
 bounded on part of the south-west by a foot-path through  
 the west by the fence against a young plantation belonging  
 now disused lane called *Hardwick-lane*, on part of the east  
 or camp called *Dane's Borough*, and on the east by the fence

Feet.			Classes of Measured Trees.															
7	9	11	5	6	7	8	9	10	11	12	13	14	15	16	17			
3	230	373	478	537	708	786	748	757	596	447	309	176	86	69	30			
4	4	9	4	1	1	2	..	..	..	..	..	..	..	..	..			
1	..	..	3	1	1	3	2	2	..	..	..	..	..	..	..			
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..			
1	234	383	485	539	710	791	750	759	596	447	309	176	86	69	30			

h Trees growing, in July 1794, in the division of Brown's  
luctive bog containing twenty perches therein), bounded  
r cart-way, and on the north-east by the foot-path.

Trees.										Number of Small Trees.	Number of measured Trees.	Total Number of Trees.
18	19	20	21	22	23	24	26	27				
38	30	22	13	6	5	5	3	1	31	558	589	
..	..	..	..	..	..	..	..	..	8	12	20	
2	1	..	..	..	..	..	..	..	12	36	48	
..	..	..	..	..	..	..	..	..	5	4	9	
..	..	..	..	..	..	..	..	..	46	....	46	
..	..	..	..	..	..	..	..	..	2	....	2	
40	31	22	13	6	5	5	3	1	104	610	714	

i Trees growing, in July 1794, in the division of Brown's  
t-path through Brown's Wood, on the remainder of the  
ation belonging to the Duke of Bedford, on part of the  
rt of the east and remainder of the north by the bottom  
ast by the fence against an ancient enclosure or wood in

sured Trees.										Number of Small Trees.	Number of measured Trees.	Total Number of Trees.
15	16	17	18	19	20	22	23	26				
86	69	30	25	15	7	3	1	1	855	5779	6634	
..	..	..	..	..	..	..	..	..	27	8	35	
..	..	..	..	..	..	..	..	..	3	12	15	
..	..	..	..	..	..	..	..	..	9	....	9	
..	..	..	..	..	..	..	..	..	3	....	3	
..	..	..	..	..	..	..	..	..	1	....	1	
86	69	30	25	15	7	3	1	1	898	5799	6697	

V.—An Abstract of the *Scotch Firs*, *Spruce Firs*, *Weymouth Pines*, *Larch*, and *Beech*, marked E, containing 1A. 2R. 25P. being part of the wood, bounded on the north and north-west by the bottom of the large fosse or ditch, and on the south and south-east by the camp; and on the south-east, by a fence through

Kinds of Trees.	Heights of Small Trees in Feet.									
	1	2	3	4	5	6	7	9	11	
Number of										
Scotch Firs .....	...	...	3	..	1	3	36	57	119	
Spruce Firs .....	1	1	3	15	7	1	2	1	6	
Weymouth Pines .....	..	1	..	2	2	1	1	..	1	
Larch .....	..	..	..	..	1	1	..	..	..	
Beech .....	..	..	..	..	1	..	..	..	..	
Total .....	1	2	6	17	12	6	39	58	119	

A Summary of the Total Number of small Trees of different Kinds, in each Division of the Wood, marked on the engraved Plan, Plate II.

Divisions of the Wood as marked on the engraved Plan. Plate II.	Heights of Small Trees in Feet.										5	6
	1	2	3	4	5	6	7	9	11			
A. R. P.												
A containing 0..0..21	...	...	...	..	..	..	..	..	..	2	9	
B .....	3..3..27	6	12	88	115	149	244	599	781	881	826	685
C .....	0..2..25	..	..	16	29	9	20	17	13	17	17	16
D .....	3..2..33	6	2	5	23	52	12	181	234	383	485	539
E .....	1..2..35	1	2	6	17	12	6	39	58	119	185	241
Total..10..0..21	13	16	99	171	242	271	839	1090	1396	1515	1490	

## A G R I C U L T U R E.

*Firs, Weymouth Pines, Larch, and Beech* Trees growing, in  
part of the ancient square fortification or camp called  
the fosse or ditch thereof; on the north by the above  
fence through a part of the site of the camp.

rees in Feet.				Classes of Measured Trees.											
6	7	9	11	5	6	7	8	9	10	11	12	13	14	15	16
3	36	57	112	182	237	308	350	355	381	286	218	129	70	48	23
1	2	1	6	2	1	1	...	...	...	...	...	...	...	...	...
1	1	..	1	1	3	..	1	1	..	..	1	..	..	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	39	58	119	185	241	309	351	356	381	286	219	129	70	48	23

Trees of different heights, and of larger Trees measured  
Brown's Wood Plantation in Wavendon, in July 1794.

	11	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	..	2	9	16	21	23	19	32	27	23	12	13	9	8	4
81	881	826	685	741	610	533	462	418	360	248	183	107	60	51	15
7	13	17	16	13	24	23	32	48	42	59	53	62	45	50	40
34	383	485	539	710	791	750	759	596	447	309	176	86	69	30	25
68	119	185	241	309	351	356	381	286	219	129	70	48	23	13	6
0	1396	1515	1490	1789	1797	1685	1653	1380	1095	768	494	316	206	152	90

s growing, in July 1794, in the division of Brown's Wood camp called *Danes Borough*, bounded on the south-west by the above ancient lane which went through the site of

Measured Trees.										Number of Small Trees.	Number of measured Trees.	Total Number of Trees.
13	14	15	16	17	18	19	20					
29	70	48	23	13	6	3	4	212	2613	2825		
...	...	...	...	...	...	...	...	37	4	41		
...	...	...	...	...	...	...	...	8	7	15		
...	...	...	...	...	...	...	...	2	...	2		
...	...	...	...	...	...	...	...	1	...	1		
29	70	48	23	13	6	3	4	260	2624	2884		

es measured in different Classes, which were growing in  
July 1794.

Measured Trees.													Number of Small Trees.	Number of measured Trees.	Total Number of Trees.
16	17	18	19	20	21	22	23	24	26	27					
9	8	4	3	3	3	..	..	..	..	..	....	227	227		
60	51	15	14	8	4	3	1	1	..	..	2875	5330	8205		
45	50	40	31	22	13	6	5	5	3	1	104	610	714		
69	30	25	15	7	3	..	1	..	1	..	898	5799	6697		
23	13	6	3	4	..	..	..	..	..	..	260	2624	2884		
206	152	90	66	44	23	9	7	6	4	1	4137	14590	18727		

It

It appeared from consulting my accounts of the sales of a great number of lots of thinnings, or poles, from similar plantations, that the average value of all the above measured-trees, was 12*d.* per foot in the year 1794; (and now, probably, the same are worth about 15*d.* per foot). I also considered the value of the tops and lop, or trimmings of the trees, as nearly equal to the labour of cutting them down for sale; and, estimating the small trees at one penny each, one with another; the general account stood as follows, viz.

14497	Scotch firs, measuring 6822 feet,	
27	Spruce do. ....	5 do.
62	Pines, ....	28½ do,
4	Larch, ....	1½ do.
<hr/>		
14590	measured trees, containing 6857 feet,	
	at 12 <i>d.</i> are worth .....	£342 17 0
4137	small trees (from 1 to 11 feet high),	
	at 1 <i>d.</i> each, .....	17 4. 9
<hr/>		
18727	trees in all, .....	£360 1 9
<hr/>		

From whence it appears that the total value of the trees in this plantation, in the year 1794, was about 360*l.*; that the average value of the whole number of trees was something above four-pence three farthings each, which is rather more than the value of each tree in the 9th class. If a mean tree, as to measure, be sought among all those which were measured as above, it will be found to fall between the 11th and 12th classes. If a mean tree be selected by regarding numbers only, that is, that there shall be as many measured trees larger than the mean, as there are smaller than it, this tree will be found in the 8th class.

Brown's Wood is situate, near the northern edge of a thick stratum of red sand (about 70 or 80 feet thick), resting upon a stratum of blue clay, or marl, which lies, I believe, but seven feet below the division C in the plan, and is the occasion of the springs and bog in the midst

midst thereof; the north-west corner of D, and a considerable part of B, at its western end, are upon the top of this thick stratum of sand, which is in that part of it cemented into thin layers of sand-stone, by the oxydation of the large portion of iron which it contains, and is on that account very poor and barren. Descending from these two barren points, in all directions, towards the bog and the vales (one through the wood where the cart-way goes up, and the other on the south side of the wood), the land grows better in quality; not only as being more supplied with moisture, but because the sand, towards the middle and lower parts of this thick stratum, are much better adapted to vegetation than the upper parts of it. Previous to the new planting of this wood in 1778, it bore a straggling crop of oak and some other sorts of under-wood, except the rocky parts, which were covered with heath only. It was

M 3 a very

a very ancient enclosure, and never appears to have been pared by the poor for fuel, as the common heaths adjoining have been, and some of them now are.

Since the whole of the planted ground is 10A. 0R. 21P. and the *Acre*, *Rood*, and *Perch*, contain 43560, 10890, and 272.25 feet respectively, we have  $10 \times 43560 + 21 \times 272.25 = 441317.25$  superficial feet, the contents thereof; which, divided by 18727, the total number of trees, gives 23.566 feet for the surface or space occupied by each tree. Now we may consider the whole ground as made up of 18727 little square plots, each containing 23.566 feet, and having a tree in the centre of each; and by extracting the square root of 23.566, we have 4.855, or about 4 feet  $10\frac{1}{4}$  inches for the side of each square, or the mean distance of the trees from each other, supposing them equally distributed throughout the whole wood; but as this is not the case, I have given the result

result of similar calculations on each separate division of the wood, and of the whole, including fences, rides, and bog, in the following table, and also added the result of a similar calculation upon the 19 acres and 51376 plants, which this wood was in 1778 stated to contain.

Divisions of the Wood, &c.	Contents thereof in Feet.	Number of Trees thereon.	Space in Feet occupied by each.	Mean Distance of the Trees			Number of Trees per Acre.
				In Feet and Decimals.	In Feet and Inches.	feet, inches	
A	5717.25	227	25.186	5.018	5 0 $\frac{1}{4}$	1729	
B	170700.75	8205	20.804	4.561	4 6 $\frac{1}{2}$	2094	
C	28586.25	714	40.037	6.327	6 4	1088	
D	161444.25	6697	24.106	4.910	4 11	1807	
E	74863.75	2884	25.960	5.095	5 1	1678	
Total on 10A. 0R. 21P.	441317.25	18727	23.566	4.855	4 10 $\frac{1}{4}$	1848	
Total with Fences, &c. &c.	482699.25	18727	25.775	5.077	5 1	1690	
11A. 0R. 13P. Mr. M's 19 Acres	827640.00	51376	16.109	4.014	4 0 $\frac{1}{8}$	2704	

In

140 AGRICULTURE.

In considering the last column of this table, it will appear that the division B has a much larger portion of plants per acre than the others have, occasioned by the stunted and dwarf state of the plants upon the rocky parts above mentioned: indeed, on about one-third part of this division, the plants had never been thinned or pruned; and it was with considerable difficulty, on account of the lateral branches, that we got in among them, to measure their heights: their general distance asunder was found to be four feet, and confirms this to have been the original distance of the plants in this wood, before the thinnings commenced, as in the last line of the above table, and the certificates delivered in 1778. And as 2722 is the number of plants on an acre, when set at four feet asunder, and 10A. 1R. 36P. or 456291 feet (including the rides and bog, which were both planted at first I believe), was the quantity planted; then

then say as 43560 (the feet in an acre),  
: 456291 :: 2722 : 28513, the number  
of trees at first planted by Mr. Moore.  
The superior soil and situation of the  
division C occasioned the thinning  
thereof to be earlier begun, and carried  
to a greater extent than in the other  
divisions, as the trees increased in size  
and height; which is the reason that  
this has the fewest plants per acre re-  
maining. By referring back to the  
table containing the actual dimensions  
of 108 trees, it will be found that the  
trees in the higher classes are much  
more irregular in their contents than the  
smaller trees are: this arises from such  
trees as stood next the fence, and were  
not drawn up to so great a height, but  
spread more to branches than those  
within the wood, and from such trees as  
had accidentally lost their leader or  
top, both which had occasioned them  
to thicken more in the trunk, and con-  
sequently they were placed in a higher  
class

## 142 AGRICULTURE.

class than their height and value justified ; and this is a circumstance which future observers should particularly attend to, as also in applying these dimensions to perfect trees of the same girt at four feet high, within a plantation. Here the number of trees altogether in those classes was so small, that the error was of no material consequence. An inspection of the foregoing abstracts of the different divisions of this Wood, will shew the superior growth of Scotch firs on this sandy soil, above all the other sorts of trees, especially when a few plants of different sorts are, as in this case, introduced among a large number of Scotch firs: in a few years the latter overtop, and at length shade completely most other kinds of trees, and thus retard their growth, if not entirely destroy them: and there cannot, I think, remain a doubt, with practical men, but that plantations for profit, should

should each be of one kind of tree, except of deciduous trees, where some are intended for timber, and others for a permanent stub of underwood.

Mr. Robert Salmon succeeded me, on the death of the Duke of Bedford, in the management of this and others of his Grace's plantations and woods; and through his kindness I am enabled to state the number of trees which remained growing in the small division A of Brown's wood, at Christmas, 1804; and, in order to shew the comparative number of trees in each class, in 1794, and 1804, I have in the following table placed the particulars opposite each other.

A Com-

144 AGRICULTURE.

A Comparison of the Scotch firs growing in the division A of Brown's Wood, at two periods near ten years distant.

Class	No. of Trees in July 1794.	No. of Trees in Dec. 1804.
5	2	—
6	9	—
7	16	—
8	21	—
9	23	—
10	19	3
11	32	2
12	27	4
13	23	12
14	12	11
15	13	9
16	9	12
17	8	15
18	4	15
19	3	6
20	3	8
21	3	3
22	—	10
23	—	5
24	—	2
25	—	2
26	—	6
29	—	2
32	—	2
34	—	1
Totals	227	130

By this Table it appears, that the growth during the period mentioned, and the various thinnings which took place therein (and I lament that I am not able to give an account of the exact value of these thinnings), had left none remaining of the classes below the 10th, but had extended the classes from the 21st, which was the largest tree in 1794, to the 34th, the largest tree found among the 130 trees now remaining. By similar calculations to those in a foregoing Table, it will be found, that the mean distance of the trees in this division is now six feet seven inches and a half,

a half, and the number of trees per acre, 990, at twenty-six years from the time of planting.

I am not in possession of any exact accounts of the value of the thinnings from Brown's Wood, previous to, or even for two or three years after Mr. Moore sold the same to the Duke of Bedford; but it will not, I apprehend, be much wide of the truth, if we suppose the net produce of these thinnings, previous to the measurement in 1794, to have repaid the original expense of clearing the ground and planting, to have paid the composition in lieu of tithes, to which it is subject, and the parochial taxes, together with the charges of looking after and repairing the fences thereof, up to that time. And if we inquire, by help of the tables of annuities, or the rules of compound interest, what annuity or rent forborne sixteen years, allowing five per cent. interest, will amount to £360, we shall thus

thus find, that this plantation of 11A. 0R. 1SP. paid to the proprietor during the sixteen years previous to 1794, an annual rent of £15. 4s. 4d. or at the rate of £1. 7s. 5d. per acre per annum, which must be considered as a very good rent for such land as this.—It was my intention to have given a rough calculation of the probable value of the trees now in Brown's Wood, founded on the supposition that the quality of the land in division A, as adapted to the growth of fir-trees, and their consequent size, number, and management, furnishes a fair average of the whole wood, as I believe it to do ; but shall desist for the present, from having compared the actual measurement of six trees therein, in different classes, which Mr. Salmon lately sent me along with the number of trees ; and finding their contents, particularly the larger ones, so much to exceed that of trees in the same classes among the 108 trees which I measured in 1794, owing

owing to the trees of my measuring being necessarily selected near the outside of the wood, there being then none in the interior parts large enough, and Mr. Salmon's trees of corresponding classes being selected from the inside of the wood; and shall conclude, with again calling the attention of future observers or calculators, when deducing or using a mean measurement for different classes of trees, to the above circumstances; and am, Sir,

Your obedient servant,

JOHN FAREY.

*12, Upper Crown-street, Westminster,*

*May 1, 1805.*

The

The SILVER MEDAL of the Society was this Session voted to Mr. WILLIAM SMITH, of Buckingham-Street, Adelphi, for IMPROVING BOGGY LAND by IRRIGATION. An Engraving is added to explain the manner of effecting it, and the following COMMUNICATIONS were received from him.

SIR,

HAVING paid very considerable attention to improvements of land by irrigation, and applied the water in a manner which I believe to be new and advantageous; I beg leave to submit my account thereof to the Society of Arts, &c. Upon this plan, the rushes and noxious plants are destroyed, the land is rendered firm, and grasses of good

good quality spring naturally. Even ferruginous waters will have a good effect thus used.

I am, Sir,

Your obedient servant,

WILLIAM SMITH.

*Buckingham-Street, October 31st, 1804.*

To CHARLES TAYLOR, Esq.

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*Mode of improving Boggy Land.*

The whole surface of the boggy ground was pared with a breast-plough, and the peaty matter thrown together in ridges, like common high-ploughed land, with a ridge, like a head-ridge, at one end of each set of ridges. Each ridge has a cut or channel for water on the top, and a drain in the furrow or hollow between it and the next ridge. The head-ridge has a larger channel for water on its top, which supplies all the other ridges with water, and this main ridge is itself supplied by its connexion

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## 150 AGRICULTURE.

with a larger channel or feeder, which first conveys the water out of the common brook-course into the meadow.

The furrow between each head-ridge and the ends of the beds has a larger drain, into which all the channels of drains in the furrows discharge their water, and which is by this main drain carried into the brook-course again. Thus the water is diverted out of its usual channel, only to float over the surface of the land, and run into that channel again lower down.

To get the water high enough to swim over the surface of any piece of ground, it is generally necessary to make a dam in the original channel, to pen up the water, till it rises to the surface, or near it, and convey it along a channel which shall have less fall than the brook, until it can be got out upon the surface. The length of such conduit or drain must therefore depend upon the fall in the lands which lie parallel

parallel to the original channel of the water; and the quantity of land that can be covered with water, depends upon the distance between the proposed new channel and the old ones.

And, to perform this business in the most methodical manner, it is necessary to new model the surface, otherwise the water (which will always find its level) would lie too deep, or move too slowly over the low places in the ground, and thereby injure the grasses by a redundancy of water, while all the higher parts of the ground would appear like little islands above the surface of the water, and consequently receive no benefit from such an imperfect system of irrigation.

Where these inequalities of surface are large and numerous, it will be attended with much more expense to make such land into a regular form for floating, on account of the great expense of wheeling the earth from the

hills to the hollows. In these cases, it is necessary (in order to avoid expense) to adopt an irregular method of floating: by taking advantage of such irregularities of surface, a meadow may often be floated at a quarter of the expense required to put it into a regular form, and this method is found to answer the purpose very well, if the works are properly laid out with the spirit level. When the fall of water is ascertained, the form of the ground is the next thing to be attended to; if there are no natural declivities in the surface, down which the water may run from the overflowings of a cut on the summit into a drain in the hollows, so that the water may keep constantly running down such slopes by a regular current, which prevents a diminution on the ridges and a quick discharge in the lower drain; to avoid an accumulation in the furrows, it must be made with good slopes and plenty of

of drains; these, with a constant supply of water in the winter, are the most essential parts of a water-meadow. The water must be constantly kept moving over the surface, and the practice proves, that where the water moves the quickest, there is always the most grass.

And, as the water must be constantly running off the land, it follows that it must be constantly running on, to keep every part of the surface properly supplied; and this requires a much greater quantity of water than is commonly imagined by those, who are wholly unacquainted with the practice of irrigation. In fact, every good water-meadow should be formed so that it may be said to be nothing but a wide extended channel for the water, no part of which should be too deep to prevent the points of the grass from appearing above its surface, consequently the water cannot be seen when the grass begins to grow. Yet it will still find its way between the shoots,

N 3 and

and nourish the grass without bearing it down, or excluding it from the benefit of the air and sun: this is a state, in which the grasses of a water-meadow increase very rapidly: in this state, no water can be seen in any part of a meadow, but in the cuts which bring it on and drains that take it off; the motion down the slopes is only perceptible where it runs off the upper cut and in the lower drain; in the still more perfect parts, when the grass has got a considerable shoot, even this part of its motion is not perceptible; and a well-regulated meadow, in the spring, cannot be known to be in a state of irrigation without walking into it. The water running among the shoots, soon becomes perceptible to the foot which proves that there is no inconsiderable quantity running down the slopes, though its motion upon that part cannot be seen.

It

It is therefore one of the fundamental principles of irrigation, to keep the water moving, and that in such well regulated quantities as shall neither be too great nor too little ; for both of the extremes are alike unfriendly to vegetation ; but I believe there is much more mischief done to a water-meadow by giving it too little, than too much water, and the greater the supply the less nicety is required in the adjustment, if the meadow is so laid out as to prevent its accumulation in any part thereof. But where the quantity of water is small, it is necessary to be very nice in the distribution of it, in order to receive the full benefit of the stream upon as much land as it is capable of floating.

Here again we must not run into extremes, and try to get the water over too much land at a time, and thereby prevent the grass from receiving the

N 4 full

full benefit of a quantity of water which is capable of giving it a good soaking: what that quantity is, will be best determined by practice, for some ground requires much more water than others.

In case of a short supply of water, which is extended to the improvement of as much land as it is capable of covering, according to the best principles of irrigation, it will be better to unite all the water upon such a portion of the work as practice shall prove it capable of covering well, and to let that part have the full benefit of the water as long at a time as is necessary to give a good soaking, or as long as it may be kept off the other parts without injury.

In some meadows, after they have had a complete soaking, which has saturated the soil, and the grass has thickened upon the surface, vegetation will not be retarded for some time for want of water, and those parts which were

were forced the most in the autumn, will require the least in the spring. It will therefore be always advisable, on account of the water and a succession of grass, to get some part of the water-meadow as forward as possible in the autumn, that that part may be dried and fed the first in the spring, while all the water is employed in forcing on those other parts of the meadow which were neglected in the autumn.

By a prudent management of the water in uniting its vegetative powers upon those pieces of meadow which are disposed to produce the earliest vegetation in the spring, and so on in succession, from the earliest to the latest pieces of ground, or those which can be made so; a regular succession of grasses might be obtained, which would be much better than trying to get the whole alike, especially, if the quantity in one person's possession be very considerable, and his quantity of water likely

likely to fail or barely to suffice for the purpose.

This method of using the water in succession upon portions of the meadow, which practice shall prove it capable of covering at one time, will be applicable to most meadows; for there are few, that are well formed, that have too much water, especially in the winter, or where there are any mills or navigations; I have generally observed that the best meadows upon the large streams, are those which have the most water and the best falls.

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*Account of the nine acres of Water Meadow, on Prisley Farm near Fletwick, Westoning, and Tingrith in Bedfordshire.\**

As the quantity of water is sometimes insufficient to float the whole of this meadow at once, it has been contrived

\*A map of this meadow, but without any account of the method of forming it, may be seen in the Communications of the Board of Agriculture, Vol. IV, page 341.

to

to be divided into three parts, by means of two large hatches, within the meadow. Each of these principal divisions may again be divided into still smaller parts, by putting a common hatch or board made to the shape of either of the main feeders, which will stop the water out of any part, and force so much the more upon that which is intended to be floated. These contrivances are often necessary on account of the great scarcity of water, and also for the purpose of employing all the water upon any one part of the meadow, while the grass is feeding off the other; and (if the levels will admit of it) something like this ought to be done in every good water-meadow, for it is not merely the elevated or high-ridged form of the surface, which constitutes a good water-meadow, but such a disposition of the parts as is best calculated for the general purposes to which the land, the water, or its produce, may be most advan-

advantageously applied. The three parts of this meadow are upon two different levels, so that the drawing of either of the hatches before mentioned lays all the high part dry, and puts either the North or the South part of the lower level afloat at the same time. By keeping down one of those hatches and opening the other, all the water may be turned either upon the North or the South part of the low level, as occasion may require; or if both the hatches be shut down, the whole of the water may be used upon the high level, or two first sets of beds.

If there is more water than is sufficient to float either of the three parts separately, either of the two regulating hatches may be fixed at such a height as to use the remainder on the upper level; or the high level of the meadow may be made to receive its full quantity of water, and an opening be left under one or both of the hatches, so as to distribute

tribute the remainder of the water on either of the parts of the lower level, wherever it may be wanting; or the whole of the water may be used upon one of the lower levels, by adjusting the hatch so that that part shall have sufficient water, and drawing up the other high enough to discharge the surplus; or, if one part is floating, and neither of the other pieces are in want of water, any overplus may be turned down the waste ditch which divides the meadow from the upland, by drawing the outside or main hatch, high enough to discharge such surplus water under it.

The water is capable of all these variations, but there will seldom be any occasion for turning any water to waste, as it may generally be all employed upon the meadow or upon a third of it. If the other two parts should be in use, it will be found most advisable to feed only one part of such meadow at a time

time, as the other two-thirds might then be floating alternately.

When that third has been fed off, the most forward of the other two may then be laid dry for feeding, and the new-fed part floated in its stead. By this plan of feeding one-third at a time, and keeping the other two-thirds afloat at the same time, either together or separately, according to the quantity of water, the water will be always constantly employed from the first commencement of floating to the conclusion of the feeding and floating after it; when the whole may be shut up together for mowing.

The spring floating may be continued at intervals, (if the water be not foul) till the grass has gained a considerable height, but it must only be put on for a day or two at a time to cool the ground, and keep the grass growing. This management, if it be well conducted, will be of great service in forwarding the

the crop and increasing the bulk ; the ground will also be the cooler and better for it when the crop comes off; consequently, it will occasion the after-grass to grow so much the quicker. No time should be lost in putting on the water immediately after the hay has been removed ; or, as soon as one-third of the meadow can be cleared, the water should be immediately put upon that part till it is pretty well soaked, and then upon the other parts, in their turns, as soon as they are cleared. Great care should be taken both in feeding and taking off the hay, that it be done with a view of clearing that part first, where the water can be first applied to the purpose of producing another crop. The water should never run to waste but in the height of summer, when the grass may be high enough to form a thick cover to the ground, and keep it cool and moist enough for the purposes of vegetation without the aid of water ; and

and also at the end of summer or autumn, when, if the meadows are fed with sheep, there may be some danger of rotting them by using the water at this time of the year. It will appear to those who are acquainted with the management of Wiltshire water-meadows (by the account annexed, which I received from his Grace the Duke of Bedford, and which states the quantity of grass cut and the time of feeding the meadow), that the grass was begun to be fed off before it was fit; and, from the long time that the sheep were kept upon the ground during the months of February, March, and April, there was much of the water wasted, which should have hourly been employed at that most prolifick season. Experience proves, that there is no danger of getting the grasses too strong upon the ground at this early season, and that crops which are six or seven inches high, and apparently too coarse and high

high for a bullock to feed, are eaten with the most eagerness by sheep in the spring; and those parts where the grass is the thickest and most luxuriant are always fed the closest, and sought after with the greatest avidity. This being contrary to the common habits of all animals which graze upon dry pastures, where they give a decided preference to short and sweet herbage, may lead many persons to think that the grass of a water-meadow may be too high and luxuriant for sheep; but experience has proved, that such long grass is neither unfriendly nor unsavoury to them; and we know, that the grass always grows the fastest when it has gained considerable height and strength. It will also thicken at the bottom, and the roots will get much stronger hold in the ground, and consequently will not be subject to feel the want of water so soon during the time of feeding, and be able to make a much stronger shoot as soon

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as it is shut up again, and the water restored to it. The greatest crop will also be of the best quality both in grass and hay, and will always be fed much closer and evener than in those places where the floating has been any ways deficient. The drowner, as he is generally called, or the man who has the superintendance of water-meadows, should therefore endeavour to make every part of the crop as uniform as possible; for no meadow can be said to be complete till that is accomplished, and a good eye may easily discover the management of a meadow by the crop upon the ground, whether it be in the spring, summer, or autumn: for, if the grass appear patchy, or of different sorts and colours, there can be no doubt but that the water has been partially applied. The different shades of the ground after close feeding and mowing, will also show the parts which have had  
the

the most water, and where it has been deficient.

Workmen who have been accustomed to the mowing such crops, can also tell all those parts by the different cut of the grass. Much of the perfection of a water-meadow also depends upon the care and pride which the drowner takes, in doing his work well. It would therefore be very advisable not to change those men too often, but to keep the water-meadow constantly under the care of the same workman, so long as he manages it well; and no one should ever alter the water but him who has the constant care of attending it. Watermeadows will never be brought to perfection in any country, till the proprietors and managers of them shall take a pride in doing them well, and strive to rival each other in excellence. Land-owners and agricultural societies should therefore offer premiums for the greatest produce that can be obtained

from a given quantity of water-meadow, and a smaller premium to the drowner or managing man. This would excite emulation, and create a conversation and rival spirit of industry, and attention to a pursuit which many might not otherwise have thought about; as the crops of water-meadows are much more at the command of the farmer and less subject to blight, drought, or uncertainty of season, than any other crop which he cultivates; this would be a fair subject of competition in the skill of the managers, and the premium should not be determined by the produce of a single crop, but by the aggregate produce of the whole year, taken in spring-feed, hay, and autumn-feed.

*Account delivered to Mr. Smith, by order  
of his Grace the Duke of Bedford, of  
the produce of nine acres from Prisley  
Water-Meadow, made out of a Bog.*

1803. *March 29th.* Stocked it with 12 score of sheep, kept them three weeks.

*April 16th.* Shut it up for hay.

*June 23d.* Cut the first crop of hay, supposed to be above two tons per acre.

*August 20th.* Cut the second crop, supposed to be one and a half ton per acre.

*September 16th.* Stocked it with four score of fat sheep, three weeks; after that it was pastured with lean bullocks, as long and as often as they could find food.

1804. *February 27th.* Stocked it with eight score and four lamb-hogs.

*April 28th.* They have now been nine weeks.—This is more than eighteen sheep to an acre for nine weeks.

O 3

It

It had more and better water this last winter than the winter before, but from our want of grass upon the farm, we have eaten it longer than we should have done.

*June 21st.* Began cutting the first crop of hay, which is a greater quantity than the year before, and a larger proportion of the best grasses.

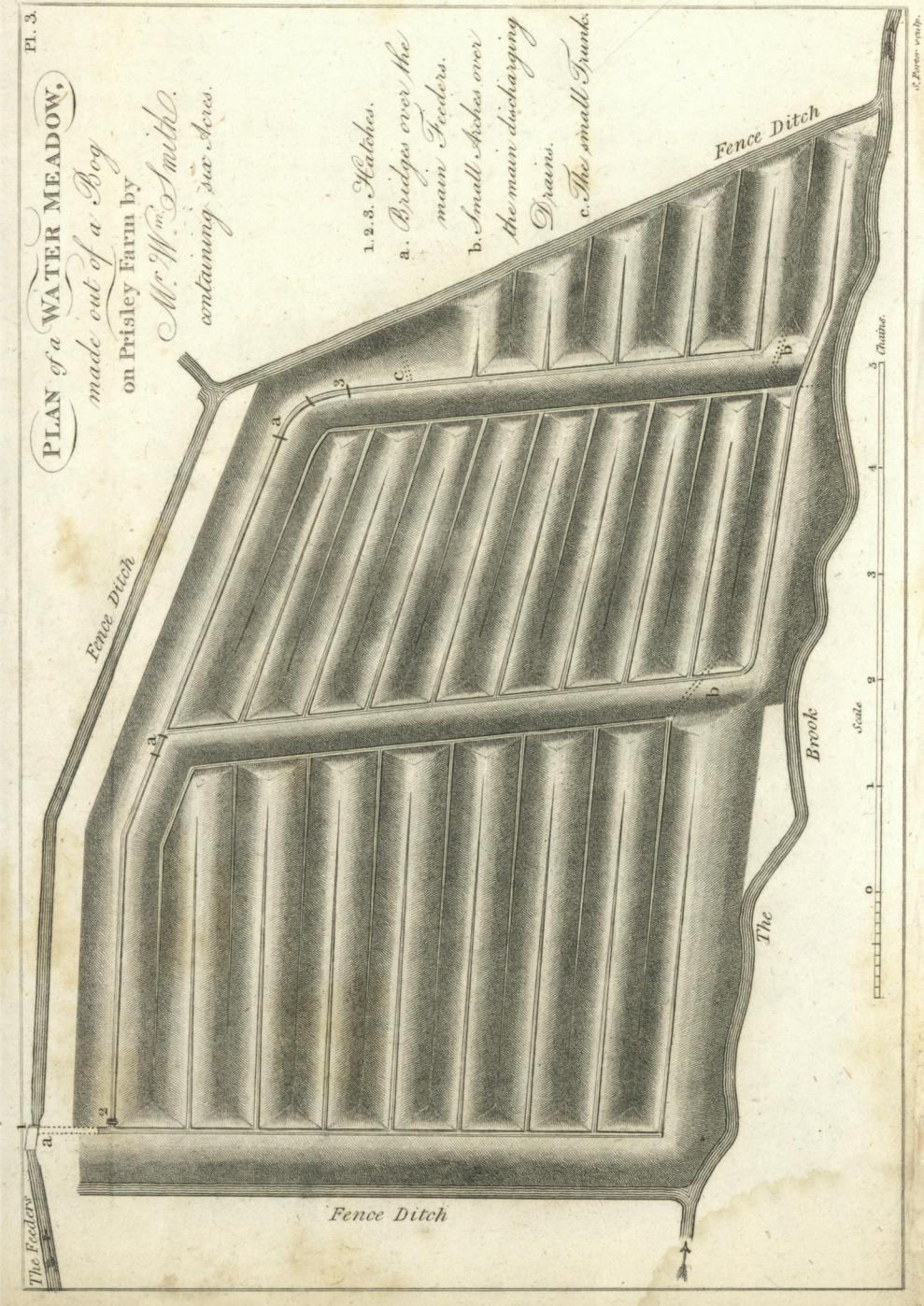
N.B. At the Woburn sheep-shearing in June, 1805, the above meadow was examined by the Secretary of the Society, when the quantity of the grass upon it was not only found to be great, but the kinds of grass it produced in general, excellent in quality, and appearing, on comparison, to improve every year.

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*Reference to the annexed Plan of the six acres of Water-Meadow, on Prisley Farm.—Plate III.*

1. The main hatch, which, when closed, occasions the water that is to irrigate the meadow, to flow into the feeder which fills the highest cuts, made upon

PLAN of a WATER MEADOW,  
 made out of a Bog  
 on Prisley Farm by  
 Mr. W<sup>m</sup>. Smith.  
 containing six Acres.



upon the first eight ridges, from which cuts it gently glides down the slopes into the eight drains, which unite and discharge themselves under the arch at b.

2. The second hatch, which regulates the water for the ten ridges in the second division of the meadow.

3. The third hatch, which regulates the water for the five ridges in the third or lowest division of the meadow, from whence it falls into the old course of the brook.

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#### CERTIFICATE.

I DO certify that Mr. William Smith, land-surveyor and drainer, from Bath, and now of Buckingham-street, London, was employed by the Duke of Bedford, to improve part of one of his farms, in the parish of Flitwick, in Bedfordshire, called Prisley Bog. That two pieces thereof, one containing about five, and the other about six acres, were in the year 1803 naked pieces of bog, (in the same state that

O 4 they

they were left, after Mr. Elkington's ineffectual attempt to drain them in the year 1795), and were wholly unproductive. That Mr. Smith planned, and entirely directed the improvement of these two pieces of land, by forming them into most complete water-meadows, a correct plan of one of which (viz. the six acres) is annexed. He has caused to be engraved also, the plan of another meadow on the same bog, containing nine acres, which he irrigated by direction of the late Duke of Bedford, in the year 1802. That these three meadows are done in the most complete manner, with many improvements, superior to any meadows which I have seen or read of; and the general improvement, both in the kind of herbage and quantity thereof, in the last summer and previous spring, were astonishingly great. Witness my hand,

JOHN FAREY.

12, *Upper Crown-street, Westminster,*  
*20th May, 1805.*

To Mr. CHARLES TAYLOR.

The

The Sum of TEN POUNDS was this Session voted to Mr. WILLIAM WATSON, of North Middleton, near Wooler, Northumberland, for his comparative CULTURE of TURNIPS.

The following COMMUNICATIONS and CERTIFICATES were received from him: and it is recommended that such persons as wish for a fuller account upon the subject, will refer to his papers on the comparative CULTURE of TURNIPS, published in the 22d Volume of the Society's Transactions, to which the present statements form a proper Appendix.

SIR,

I HAVE seen a list of Premiums, &c. offered by the Society for this year. On several of the subjects, namely, the comparative culture of turnips, comparative culture of wheat, the cultivation

tion of spring wheat, the rotation of winter tares, turnips, and wheat, I shall probably be able to address the Society with confidence; as I am now conducting experiments with great accuracy.

This year I have no wheat after beans, but I have about ten acres after drilled peas, upon land not sufficiently good for beans. It is pretty well ascertained, that in favourable situations, with respect to climate and soil, wheat may be cultivated with great advantage after drilled and well-hoed beans; but in late springs the land cannot be sufficiently pulverized and cleansed for beans, so as to afford a prospect of getting them off the ground before the middle of November; and in such cases, and in almost all seasons, upon inferior soils, it seems of consequence to encourage the culture of drilled peas, which may be sown from the 1st to the 25th of April, and which will ripen in September, or early in October. I am therefore trying that management with accuracy.

accuracy.—I make these experiments for my own satisfaction and instruction, in the first instance, and with a view of communicating the results to the world as soon as I can speak with confidence.

My turnip experiment is this year made with the dung in a perfectly good state, and in quantity about twenty-eight loads per acre, or double that used last year. It is also varied in the mode of sowing with the narrow intervals. I cannot conceive a more advantageous system in certain situations, and to a moderate extent, than that of winter-tares, turnips, and wheat. I have tried it in two seasons.—This year I cut four acres of tares, and sowed the land, in a well-pulverized and perfectly clean state, with turnips within the month of June.

I am, very truly, with great respect,  
SIR,

Your most obedient humble servant,  
W. WATSON.

*North Middleton, July 17th, 1804.*

To CHARLES TAYLOR, Esq.

SIR,

SIR,

I HAVE to request that you will do me the honour of laying before the proper meeting, the following account of an experiment on the comparative culture of turnips.

In June last, I prepared about ten acres of light gravelly land for turnips, in the usual manner.—The whole of this ground produced turnips in 1802, and spring-wheat in 1803, and was much alike in all parts in quality and condition. About four acres of it were sown in the broadcast mode, and nearly the whole of the other part in drills upon one-bout ridges, with intervals of twenty-six inches. In January last, I weighed the turnips produced upon a part of these ten acres, making choice of two pieces of ground in different sides of the field, where the drilled and broadcast turnips were contiguous *in each piece*, where the ground was

was alike in quality, and where equal attention had been bestowed in hoeing. In one trial, the weight of the drilled was to that of the broadcast turnips, as five is to three, and in the other as six to five. This variation in the ratio of the weight I imputed partly to a difference in the time of sowing; a few days having been suffered to elapse, in order that that operation might be performed when the soil, under each mode of culture, was in a similar state with respect to moisture, and partly to a small difference in the quality of the dung, the only manure applied; for, though it was almost totally the produce of one fold yard, yet, as a small quantity of stable-dung was carried from another, and mixed with it to promote a speedy fermentation, it is probable that some parts of the dung-hill might be more fertilizing than others. Having anticipated what might reasonably be advanced on this ground, against the accuracy

accuracy of my experiment, I carried sixty loads of dung from one straw-yard to the field, in the latter end of April last, and mixed it completely; and as the whole of this manure was raised among lean cattle, which were fed with straw only, it was an homogeneous mass. Towards the end of May, it was pretty well fermented, and as rotten as that used in general practice.—On the 6th of June, I examined it again, and being satisfied that it was singularly fit for the purposes of experiments, I marked out a piece of ground near it (containing about three thousand and twenty-three square yards) which I had very minutely examined, and which was throughout precisely similar in quality and condition. This piece of ground (the quality of which was below mediocrity) had been prepared in the same manner as the above ten acres, of which it was a part. I divided it into three ridges, and on the afternoon of the above

above day, sowed it with the same kind of turnip-seed, without the smallest variation of weather. One of these parts was sown in drills on one-about ridges, with intervals of twenty-six inches; another on the broad-cast mode; and the third in drills upon a flat surface, with intervals of thirteen inches.—In the latter, the seed was deposited immediately after the furrow was turned by a drill-machine fastened to the plough, and as it was well covered in the rut made by the coulter of the machine, this ridge was not harrowed afterwards; the dung, therefore, was as well covered as it could be in this mode of cultivation.

In order that the manure applied to each of these ridges might be equally moist *on every part of them*—I did not use any—not the smallest particle—but what was taken from the inner part of the dunghill. Each ridge was manured at the rate of twenty-seven two-horse

horse cart-loads per acre precisely. In this, as well as in every other operation, the greatest accuracy was observed; the same person hoed every part of these ridges, performing that work on each, in the same kind of weather, and leaving the plants, in each mode of culture, about a foot asunder; which distance, however, it is scarcely necessary to observe, applies to the rows only of the drilled turnips.

For the accounts of hoeing, and other particulars relative to the management pursued in each mode of cultivation, I beg leave to refer to my letter to you, published in the 22d Volume of the Society's Transactions, page 92.

Several showers of rain within a fortnight after the seed was committed to the ground, promoted the vigorous growth of abundance of plants on each ridge; but as the soil is light and gravelly, this favourable appearance was considerably altered by the succeeding

ceeding drought in July. The plants revived, however, after the rains in August, and proved a full crop on all parts of the land.

All the turnips produced upon one half of each ridge, were exactly weighed on the 29th of January, after the tops and tap roots were cut off, and on the 13th of last month the whole of the remaining turnips were weighed with equal accuracy. The number of square yards in each ridge was ascertained with the utmost precision.

	tons.	cwt.	st.	lbs.
The turnips on the ridge with broad intervals weighed at the rate of .....	16	10	4	6 per acre.
Those on the ridge with narrow intervals, at the rate of .....	11	19	3	11 ditto.
And those on the ridge sown in the broadcast mode, at the rate of .....	12	8	1	13 ditto.

On adjoining land, superior to that upon which the above experiment was made, but considerably below the first-

P rate

rate quality, I last season obtained, in the Northumberland mode of drilling (on one-bout ridges with intervals of twenty-six inches), thirty-four tons of turnips, *after about fifteen two-horse cart-loads of dung per acre.*

The above experiment having been conducted on a sufficiently large scale, I beg leave to become a candidate for the Society's premium,

And am, Sir,

Your most obedient humble servant,

W. WATSON.

*North Middleton, near Wooler, Northumberland,*

*March 1st, 1805.*

To Mr. CHARLES TAYLOR.

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Certificates from Adam Rutherford, son of John Rutherford, farmer, at Lookout, by Berwick-upon-Tweed; and J. Bartrim, husbandman, of North Middleton, confirmed the above statement and the accuracy of Mr. Watson's experiments.

The

The GOLD MEDAL or THIRTY GUINEAS, at the option of the Candidate, was this session adjudged to Mr. SETH BULL, of Ely, for PLANTING OSIERS. The following ACCOUNTS and CERTIFICATES were received from him, and the Pecuniary Reward paid to him, at his desire.

An Account of other Plantations of Osiers, for which Mr. BULL was rewarded, may be seen in the 20th Volume of the Society's Transactions.

SIR,

THE plantation of osiers, for which I received a premium in the year 1802, grew so luxuriantly, as to convince me that the nature of the soil was peculiarly favourable to them, I was induced to make a further experiment of a piece of unembanked fen land,

P 2 very

very near the former, containing upwards of seven acres, which I planted in the spring of this year, and beg leave to offer myself a candidate for the premium given by the Society for the Encouragement of Arts, &c. for the planting of osiers. Perhaps it will not be deemed unnecessary for me to state, that in the summer of 1803, I prepared the land by throwing it up into beds, each four yards wide, and raised them full eighteen inches higher than the natural soil. The land being remarkably low, and covered for the greater part of the year with water, rendered such a step, though very expensive, absolutely necessary previous to planting. I planted about fourteen thousand cuttings, or sets per statute acre, and indeed pursued the same steps, which I had so successfully adopted in my former plantation. The plants, consisting of what are called French, new-kind, and osiers, were all of my own growing, and  
**of**

of the best quality. That they thrive very well, that I have kept them well, and perfectly free from weeds, the Rev. Mr. Mules, and Mr. Lutt, jun. both of Ely, will certify; and I can with truth assert, that though the annual rent of the land per acre could not be estimated at more than five shillings for feeding with cattle, by reason of the short time in the summer it was usually dry; yet, now that I have been at the expense of planting it, the labour necessary only to prepare the rods for the basket-makers use, amounts to upwards of five pounds per acre, per annum.

I remain, Sir,  
Your much obliged,  
And very humble servant,  
SETH BULL.

*Ely, 12th November, 1804.*

CHARLES TAYLOR, Esq.

## CERTIFICATE.

I, EDWARD LUTT, measured the land planted by Captain Bull in April last, and found it to contain 7A. 1R. 29P. EDWARD LUTT, jun.

And we have often seen the plantations, and assert that they are exactly in the state as above described by him.

CHARLES MULES.

EDWARD LUTT, jun.

—  
SIR,

IN reply to your letter of the 10th instant, I shall insert, for the information of the Society of Arts, &c. the whole of the expense of preparing the land, sets, planting, weeding, &c. of a statute acre of osiers, and also add the amount of the annual value of an acre, which I planted in 1801, and I have a very fair prospect that my last plantation will prove equally productive in future.

*Expense*

*Expense of planting a statute acre  
of Osiers.*

	£. s. d.
Throwing up the land into beds, or bars, by trenches or ditches, and raising the soil full eighteen inches higher than it is in its natural state (vide my letter of 12th of November last), 160 poles, at 1s. 6d. each, .....	12 0 0
Fourteen thousand sets, at £1. per thousand, ..	14 0 0
Planting ditto, at 3s. per ditto, .....	2 2 0
Weeding twice in the course of the summer with hoes, or reaping-hooks, generally with the latter, and performed usually by women and children, .....	0 16 0
Total Expense .....	£28 18 0

*Annual value of an acre of Osiers, upon  
an average of the whole quantity, which  
I planted in 1801.*

D.R.	£. s. d.
To rent, of the land I value at 10s. though never let at more than 6s. for feeding cattle, .....	0 10 0
Weeding twice, .....	0 16 0
Fencing and parochial dues, .....	0 10 0
Cutting the rods, at 3s. per score bunches of forty-five inches in circumference, each eight score, .....	1 4 0
	Interest

	<i>£. s. d.</i>
Interest of the money for the expense of planting,	1 9 0
Filling up the plants which die annually, ....	0 6 0
Dr. <span style="border-bottom: 1px solid black; padding-bottom: 2px; margin-left: 10px;">£4 15 0</span>	

## C.R.

By 160 bunches of green rods, which I have sold upon an average of three years, at 1s. 4d: each (unpeeled), .....	10 13 4
Dr. .....	4 15 0
Net profit per acre ..	£5 18 4

† N. B When they are peeled, which is almost always the case, the labour is at least £4 per acre in addition to the above, and will pay very well for the trouble and expense attending it, and that is performed also by women and children principally.

Thus, Sir, by the above statement, which I pledge myself to be correct, it will appear to the committee, that an acre of land, whose utmost value to the *occupier*, could not be estimated even at £1. 10s. per annum, and to the owner not more than 10s. is rendered, by planting osiers, capable of giving employment to numbers of the poor, whose labour only amounts to six guineas per acre,

acre, for preparing the rods for the basket-makers use; and also, yielding nearly an equal sum to the planter, to remunerate him for his trouble, &c. of attending to the business.

I must also beg farther to state, that I planted my osiers between the latter end of February and the beginning of April last, and I hope to be allowed to take credit to myself for the superior degree of order I keep my plantations in. I have also planted round them nearly one thousand willow-trees.

I beg also, Sir, to return you thanks for your polite attention to every part of my former letter,

And remain your much obliged,  
And very humble servant,  
SETH BULL.

*Ely, January 13th, 1805.*

To CHARLES TAYLOR, Esq.

The

190      AGRICULTURE.

The above account is confirmed by a subsequent letter from the Rev. Charles Mules, who added, that Mr. Bull's plantation of osiers is by far the best that he has seen in the isle of Ely, and that he is inclined to believe Mr. Bull will clear twenty per cent by his purchases.